January 1990

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THE COLOR COMPUTER MONTHLY MAGAZINE

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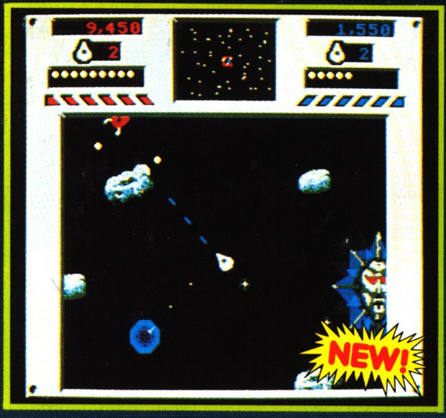
SUNDOG SYSTEMS

Sinistaar



Sundog Systems proudly presents the first 512K arcade game available for your CoCo III! If you don't have 512K, you will want to get it just for this game! The evil Sinistaars have invaded the galaxy and it falls to you to destroy them. These fiends will attempt to hold you with a constant barrage of drone ships while they muster their strength, and eventually find and obliterate you. Your mission is to mine the myriad asteroids in search of the precious ore which can be refined into sinibombs, your only weapon against the Sinistaars. Many surprises await as you advance through the increasingly difficult stages. Experience the fast-paced action of 512K packed with spectacular graphics, sound effects, and voices! Dozens of stages will keep you coming back for more. Req. 512K CoCo III and disk drive.

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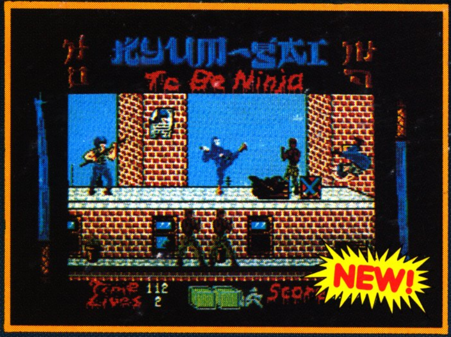
KYUM-GAI TO BE NINJA



Something is killing off the members of the legendary order of Kyum-Gai. In desperation, its leaders have called upon the powers of the life stone to resurrect you, their greatest hero: the NINJA GAI-DAN. Now, you must find and destroy the evil forces behind this dark plot. Use a multitude of martial arts moves to defeat your enemies, obtain treasure and weapons, and evade obstacles. *Kyum-Gai: to be Ninja* uses the most detailed 320x200 resolution, 16 color graphics, the highest quality digital sound effects, and spectacular animation to bring you the greatest martial arts game your CoCo III has ever seen. Created by the author of *Warrior King*, this incredible arcade game is a definite must for your CoCo III software collection. Join the ranks of the Kyum-Gai and find out what it means to be Ninja! Req. 128K CoCo III, disk drive, and joystick (2-button joystick supported).

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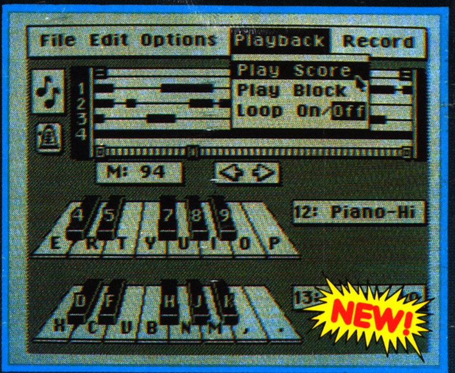
SOUNDTRAX



SoundTrax is an unprecedented sound sequencing system for the CoCo III. It requires *no* extra hardware (i.e. midi keyboards, cables, etc.). All of it is contained in your CoCo. This amazing program will read in a digitized sound and play back all of the notes in the octave in which it was recorded. And it's POLYPHONIC! You can sequence up to four voices at one time, and not only the same sound! With as many voices as can be held in your memory, depending on the song, you can create a score of up to THREE DAYS in length using drums, horns, strings, even your own voice! And you can play them all together! Using the built-in windowing point-and-click editor, you can cut, paste, even synchronize the score to just the way you like it. Use the pre-sampled sounds from the disk included, or make your own by importing them from some of the more popular digitizers available. Also, CALL for the availability of extra sound sample disks! Get it today; you won't believe your ears! Req. 128K CoCo III, mouse/joystick, and disk drive.

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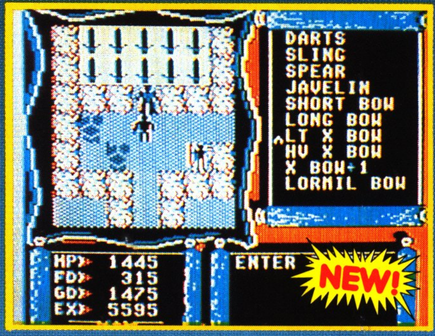
Paladin's Legacy



```
DARTS
SLING
SPEAR
JAVELIN
SHORT BOW
LONG BOW
LT X BOW
HV X BOW
X BOW+1
LORMIL BOW

HP> 1445
FD> 315
GD> 1475
EX> 5595
ENTER
```

Years after the mysterious hero called the Paladin disappeared, loathsome creatures, spawned from the bowels of the planet, have overrun the land of Tarinth and captured the king. The situation is grave, for without the king's influence, the three nations will not unite against the growing evil. Only one pure of heart can master the five magics and thereby fulfill the Paladin's legacy and save the realm. Adventure into this vast land of fantasy, interract with its inhabitants, explore the ruinous mines, and do battle with supernatural forces. Experience the magic of the quest in this fast-paced role-playing adventure, all in the familiar quick scrolling, bird's eye play format. You will love the feeling of playing an action game with great graphics, animation, and sound effects, but all the while solving one of the most involved adventures yet. Tarinth awaits its savior! Available for all CoCo models! Req. 64K CoCo and disk drive.

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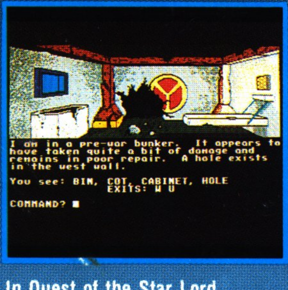

```
I am in a pre-war bunker.  It appears to
have taken quite a bit of damage and
remains in poor repair.  A hole exists
in the west wall.

You see: BIN, COT, CABINET, HOLE
              EXITS: W U

COMMAND? ■
```

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128K CoCo III. $34.95
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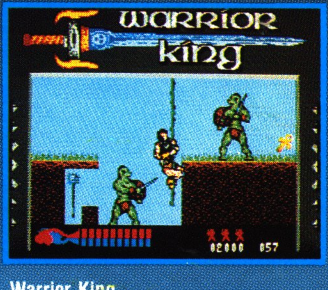

Warrior King
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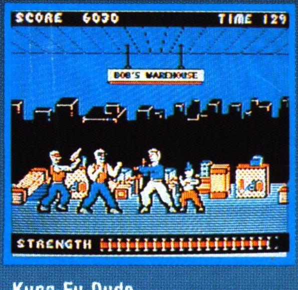

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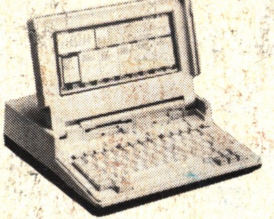

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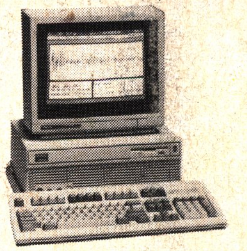

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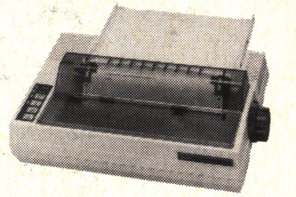

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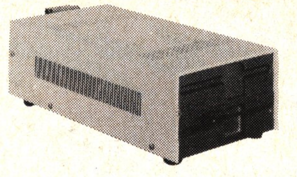

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RAINBOW

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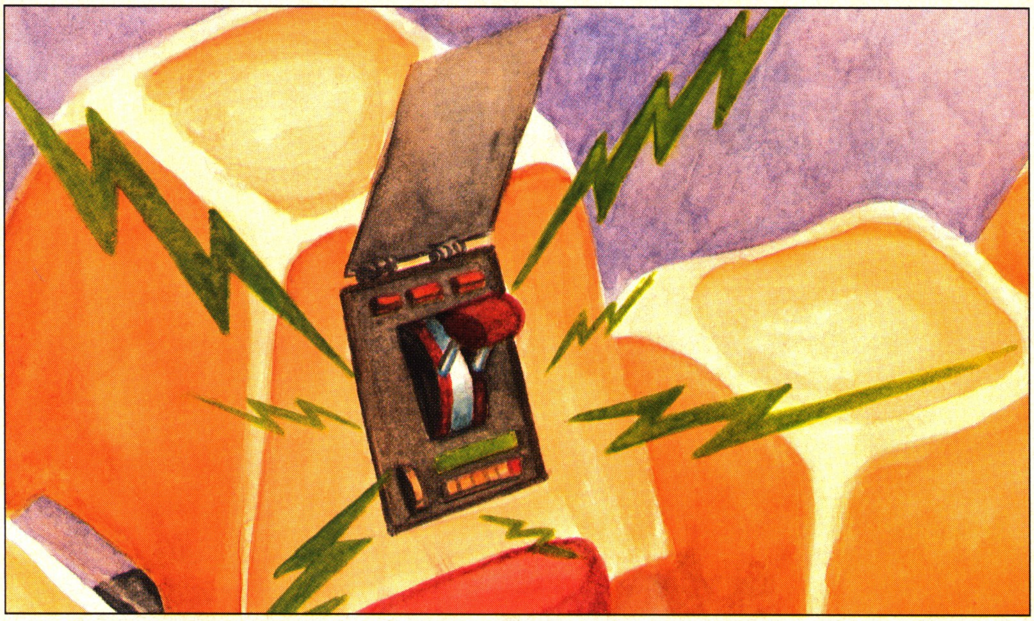

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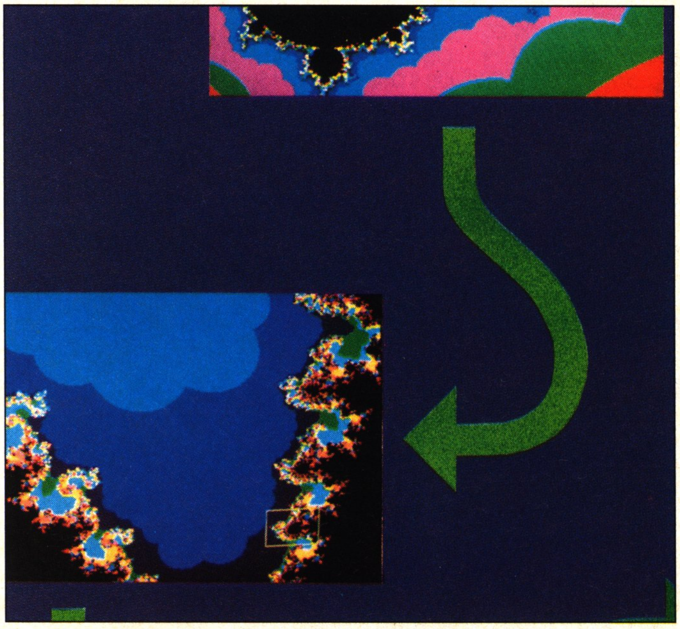

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From reader to writer

"Barden's Buffer" and "Education Notes" will return next month.

The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE.

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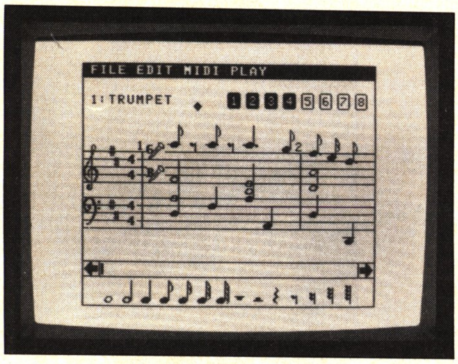
For RAINBOW Advertising and Marketing Office Information, see Page 128

Cover illustration by Fred Crawford

Letters to the RAINBOW

Correction

An error in production resulted in an incorrect photo placement on Page 76 of the December 1989 issue. The photo appearing on that page was of UltiMuse 3, *not* Lyra *as the text implies. The correct photo appears below. We apologize to both Rulaford Research and Second City Software for this mistake.*



The Old Kid on the Block

Editor:

I was really impressed with my first issue of THE RAINBOW a couple of years ago. It has been more than a year since I bought your magazine so I picked one up at the bookstore. Reading through it, I was a little disappointed that it contains so little about the CoCo 2. I realize the CoCo 3 is the new kid on the block, but there are still a lot of CoCo 2 lovers out here.

I hope THE RAINBOW remembers not everyone can afford to run out and buy the latest version of a good thing. I really enjoy your magazine, and I realize it's hard to please everyone, but keep up the good work and don't forget the CoCo 2s.

Linda Sigite
Alton, Illinois

Help a Possibly Distant Relative

Editor:

I'm looking for a program for the CoCo 2 that I can use to create a family tree. I've seen one for the CoCo 3 but nothing for the CoCo 2. If someone has such a program, please contact me.

James L. Mollman
7924 48th Ave.
Kenosha, WI 53142

Inspiring Authors

Editor:

When are we going to see some more additions to the Rainbow Bookshelf? I would like to see something along the lines of "The Completely Official RAINBOW Beginner's Tour Guide Through OS-9 Level 2 Assembly Language Programming Techniques, Procedures, Practices and Methods." The book would help those of us who know a little about assembly language to gain the skills we need for turning our ideas into completed programs that run in the OS-9 environment. This can only be good for the CoCo community and consequently for THE RAINBOW.

Robert W. Kemper
Hinesville, Georgia

Blaster Alteration

Editor:

Congratulations on your *Blaster* program. I was writing a similar one, but I don't need to any more — thanks.

Since I am using the new Extended *ADOS-3*, which starts in lowercase, it was necessary to place a `POKE 282,255:` at the start of Line 20. The 34 in lines 810 and 830 was changed to 39 to permit access to 40-track disks.

Line 850 had to be changed because the sectors above `ES` and those below `SS` are never accessed in the multiple-track search. Lines 842, 844 and 846 are also added:

```
842 LOCATE5,22:PRINT"S E A R C H
 I N G";:FORTR=ST TOET
844 IFTR<ET THEN NS=18 ELSE NS=E
S
846 IFTR>ST THEN MS=1 ELSE MS=SS
850 FORSC=MSTONS:GOSUB40:GOSUB28
0:PA=INSTR(1,A$,WD$):PB=INSTR(1,
B$,WD$):PC=0:IF (LEN(WD$)=2)AND(
RIGHT$(A$,1)=LEFT$(WD$,1)) AND(L
EFT$(B$,1)=RIGHT$(WD$,1))THENPC=
1
```

I think the above alterations will help other users.

Eduardo S. Prado, Jr.
Sao Paulo, Brazil

A Thousand Words Without a Picture

Editor:

Will someone please help me? I have a Color Computer 3, FD-502 disk drive, DMP-132 printer and *DeskMate 3*.

DeskMate 3 has a Paint application as well as a Print command for any graphics you create with it, and the DMP-132 printer has graphics capabilities. The problem is, the printer won't print graphics.

I consulted the folks at my local Radio Shack several times, and they suggested that I did not have the DIP switches set in the correct position. They said that I must have had Switch 1-8 in the Word Processing mode instead of the Data Processing mode. Life should be so easy.

Most recently I was able to take my printer to Radio Shack so the manager could hook it up to his CoCo 3 and disk drive. I had the same results, and it did no better when he connected a new DMP-133 and tried to print graphics from the *DeskMate* Paint application on it. All I get on either printer are continuous lines of dot matrix.

Robert Norman
640 Greenbriar Drive
Harrodsburg, KY 40330

Hard Drives Versus Floppies

Editor:

I recently acquired a MiniScribe Model 3425 25-Meg hard drive. This drive was originally configured in a TallGrass case with a TallGrass controller and used on an IBM PC. If the controller was stripped off and a CoCo controller (such as the type used with the Seagate drives) purchased, could this drive be made to work with a 64K CoCo 1 or 2 with OS-9?

Can you give all of us hard drive neophytes a clear and detailed explanation of how a hard drive works and the differences and similarities between hard drives and floppies?

Keith Abbott
Urbana, Illinois

See the March 1989 issue (Page 44) for a comparative look at hard drive systems for the CoCo.

Tazman Fix

Editor:

Two of our customers recently reported experiencing problems while attempting to load our newest game, *Tazman*. After typing in `TAZMAN` to load the game, they both received Error 214, No Permission. After investigation, it was discovered that the cause of the error was a missing window server. If windows are not opened after booting OS-9, an Error 214 occurs. Otherwise the game loads and runs perfectly.

Only those copies of *Tazman* sold during the Somerset RAINBOWfest last month seem to be affected. We have already be-

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(See Details on Page 17)

NEW

CIII Pages

by Walter Bayer

The *ultimate* **desktop publishing** program for the CoCo 3. Allows COMPLETE CONTROL of all the elements in the page! Features pull-down menus, icons & dialog boxes, drawing tools (create boxes, polygons, rays, circles, elipses, brush shapes), cut, copy, stamp, paste, zoom, flip horizontal/vertical, enlarge/reduce, rotate at 45 & 90 degrees, stretch, undo, import any ASCII text (even CoCo Max 1/2 Creations & Fonts!), create 2/3 columns, change fonts/invert text & page preview. Includes 14 fonts & 60 pieces of clip art. **No other desktop program comes even close.** Req. CoCo 3, RGB/ Monochrome Monitor, Min 1 drive, Tandy Hi-Res Interface, Joystick/mouse & DMP 105/106 or Epson/Gemini & Compatible Printer. Only **$49.95**. w / Hires Inteface Only **$59.95.** w/ Hires Interface & Mouse: **$79.95**

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gun contacting every customer who purchased *Tazman* to alert them to this problem and to supply them with the fix.

In order to get *Tazman* running, do the following: While your system disk is still in Drive 0, type `INIZ W6`. Then put in your *Tazman* disk and follow the instructions in the manual from Step 5. When distributing disks at RAINBOWfest, Eversoft Games did not take into account the people who start their systems up without any windows initialized. We apologize for this problem and will supply an updated disk free of charge for anyone who mails the master disk back to us.

I can be contacted on Delphi (username JEMGE), or by writing directly to Eversoft Games, Ltd.

Judith A. Emge
Eversoft Games, Ltd.
P.O. Box 3354
Arlington, WA 98223

Michigan Squinter

Editor:

Each month I eagerly await my precious copy of THE RAINBOW. When my November issue arrived, the first thing that caught my eye was a game of checkers for the CoCo 3, but the listing's type size had been reduced so much that it is impractical to type in.

Although I noticed in the Reader Survey a few lines for comments, I didn't see any questions pertaining to the change in type size. Type size is very important in listings. The smaller the type, the greater the risk of errors, and the less interest one has in typing in the listing. I only hope enough readers write in and complain to change your mind.

Harold R. Burchett
LeRoy, Michigan

The fact is, we simply cannot maintain the current volume of material with wider listings. A wide listing 90 inches in length takes up four and one-half magazine pages, while a narrower listing of the same length takes up only three. Still, we always keep an open mind where reader opinions are concerned. Thank you for sharing yours.

Looking for Improvements

Editor:

I am using a CoCo 3 with *VIP Desktop*. It's a great program, but I need more. Has anyone written a program to enhance the database program? Some of the improvements I'm looking for include being able to use a RAM disk with the program for faster access, run databases larger than the current 550 records (select drive capacity), and change and add fields to the database.

If someone can help in any of these areas, I would appreciate it.

Todd Conkey
10903 83rd Ave.
Delta, BC V4C 2E9
Canada

Unshaky Bob

Editor:

After reading the software review of *Notes* in the July 1989 issue of THE RAINBOW, I sent for a copy of the program from Robert Pori. The program I received loaded easily and the documentation made editing a song simple. When I tried to print it out on my printer, it wouldn't run.

A letter to Bob Pori brought a quick, responsive phone call in which we discussed possible corrections. These suggestions got the printout working, but there remained one small bug. I contacted Pori again, and — in spite of his house being badly damaged during the recent California earthquake — he managed to correct the bug and to send me a revised program on disk.

If anyone is interested in printing out music scores on a computer, I recommend *Notes* and the services of Bob Pori.

Deane Milliken
Spartanburg, South Carolina

Inserting a Caret

Editor:

In your recent One-Liners for the Color Computer, I noticed the use of the caret (^) symbol as a type-in requirement. Neither my Color Computer 2 keyboard nor my Brother portable has that symbol, and I am not sure what key to use.

L.J. Busching
Port Hueneme, California

To generate the caret, press the up-arrow key. You will see an up-arrow on your screen, which is the CoCo's representation of the caret character.

My Son Needs Games

Editor:

I would like to express my concern about the future of RAINBOW magazine. You have given your readers constant affirmation that the CoCo and therefore THE RAINBOW continue to thrive, but when I look at the dwindling size of my magazine, I can't help but wonder. I would like to see more games published. Personally I am impressed by the amount of assistance provided to CoCoers by your regular and guest columnists, but it is the games that keep my son interested in learning about computers.

Now I would like to praise Cer-Comp's *TextPro IV*. I purchased the program and when it arrived in the mail (three days after I phoned in my order), the disk did not function properly. I called Cer-Comp and Bill Vergona patiently went over the loading and operating procedures with me to make sure the problem was not from my end. He finally suggested I send the disk back to him to be checked out. The disk was faulty and was replaced immediately. All of this took less than a week. After using the program for several months, I find that it is all that I could have wanted. My thanks to Mr. Vergona for an excellent program that is worth the investment.

Andrea Lee Stevens
Suisun City, California

Preparing for a Purchase

Editor:

I am going to buy a Tandy Color Computer 3 in the near future. For my own purposes I do not need a full-size printer. The least expensive Tandy printer is the DMP-107, which lists for $279.95 — more than the Color 3.

I contacted Tandy in Texas, and the representative said your magazine had information on less expensive printers for the Color Computer 3.

Could you please help me out? I need something small, such as the TP-10 printer.

Ray Roberts
New York

Several of our advertisers offer feature-packed printers in a price range you may find more suitable.

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

"...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.

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Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/ Composite/Monochrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make it a breeze to use!

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Print and Edit documents at the same time!

SORTING

Sort lists in a flash!

GRAPHICS

Insert **graphics** in your documents! Allows you to import PMODE 3/4, HSCREEN and CoCo Max II/III pictures!

CALCULATOR

Built-in 4 function calculator!

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Align your text in 2 columns with a few keystrokes!

SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!

MAIL MERGE

Type a letter, follow it with a list of names & addresses and have Word Power print out personalized letters. Its that easy!

SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving, **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.

MACROS

Playback up to 250 keystrokes with a single key! Automate multiple tasks with a single key! You'll love it!

SPELLING CHECKER

Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.

PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks, justification and more.

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, double-words, a/an usage, spaces and more. Its the perfect addition to any word-proccessor.

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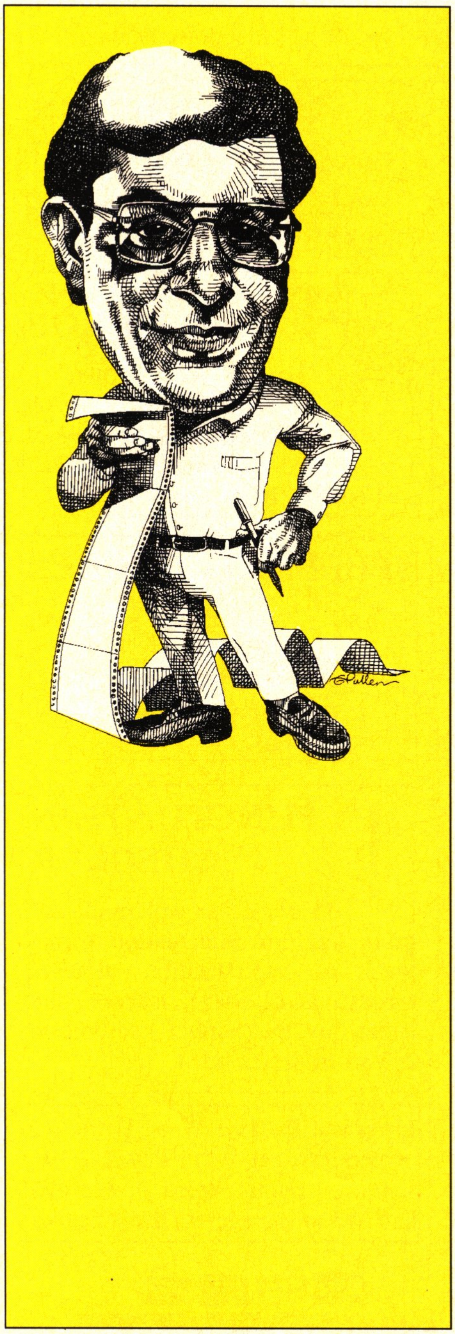
History in the Making



I am just back from RAINBOWfest with some of the most exciting news we have had in a while — the final agreement has been reached to allow us to publish a history of our Color Computer.

As far as I know, no single computer has a book about its history. This is probably because few computers are as long-lived or have attracted such a following as has our own Color Computer.

The working title for this book, which we expect to publish in late summer, is *CoCo — An Affectionate History of the Tandy Color Computer*. The authors will be Dale and Esther Puckett.

Dale, as many of you may know, has served for more than two decades as an officer in the United States Coast Guard. Esther has served along with him in a number of places and in a wide variety of locations. Dale's personal computer experience goes back as far as it can — to the Altair kit.

Dale brings the seriousness of the scholar and the care of a programmer to the team. Esther, as all of you who are fortunate enough to know her know, provides wit and wisdom as well as excellent insights to just about everything. They will, I believe, make an excellent team.

Dale and Esther plan to get started slowly as they wind up their tour of duty with the Coast Guard. Once that happens (around the first of February), they plan to move back home to Kansas and work on the book full-time.

Production for the book was planned a couple years ago with former RAINBOW editor Jim Reed as the author. Jim, however, did not feel capable of writing a history to the extent I wanted, and we suspended the project. Now it is active again and, I feel certain, on its way to completion!

CoCo will, most significantly, be about people like you. I have stressed to Esther and Dale that they must, of course, give full and in-depth information, including anecdotes and stories, about every person who was part of the CoCo Community — even before there *was* a CoCo Community. As an "affectionate history," this is important if we are to demonstrate in print the affection so many of us feel for our favorite computer.

Beginning in February, Dale and Esther will be doing a lot of traveling and telephone calling, interviewing hundreds and hundreds of people for hours on end. Their result will be an entertaining and factual account of how one computer attracted a huge following totally beyond the expectations of its developers and how it affected and changed so many of our lives.

We project that *CoCo* will be between 200 and 300 pages, including photographs, and will sell for about $15.95. It will be the paperbound book, like the others in our Rainbow Bookshelf collection, with an attractive cover.

In addition, we plan to publish a hardcover special limited edition that includes the gold-foil stamped name of the person who buys the book. We will take advance orders for these and they will sell for $45. I am not going to hype the phrase *collector's item*, but this would be a perfect gift for any member of the CoCo Community.

Either this month or next month we will be offering the soft-cover version of *CoCo* on an advance basis, at a discount of $13.50. Gift certificates will be available for this holiday season.

I am very excited about this project and I think you will be, too. After all, I think the computer that has made history deserves a history book of its own!

—Lonnie Falk

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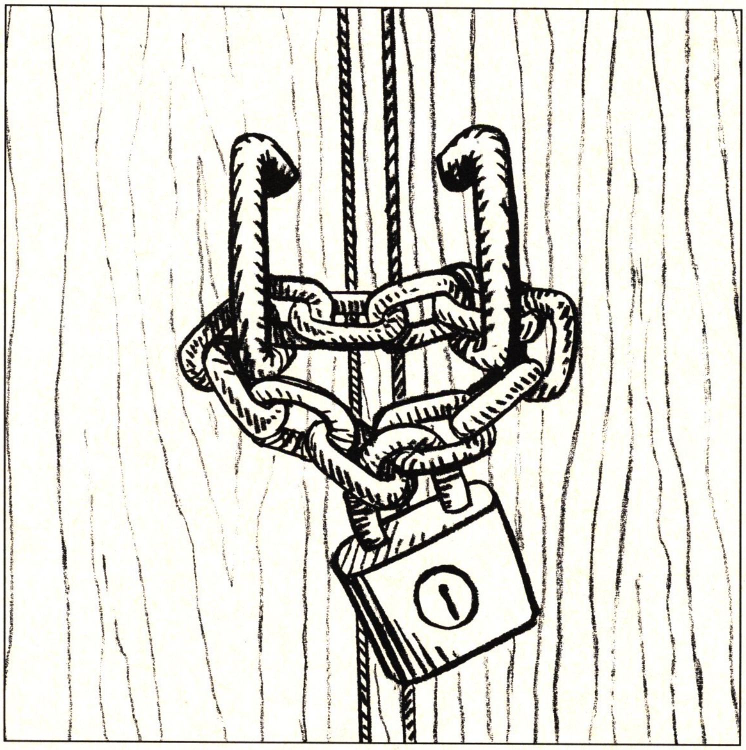

Save the Variables!

by Mike Moore

This handy program enables you to chain BASIC programs or keep all the variables while you edit a program. I find BASIC's habit of erasing all variables during EDITs or PCLEARs to be very annoying. When you are debugging a program and have entered lots of data, it is very frustrating to lose it all because of a small error that needs correcting. I used to wonder why it happened, and in writing this program I think I found out.

The idea sounds simple enough. To save the variables we move the bytes that BASIC has stored into free memory and later bring them back again. With numeric variables this is easy enough, but string variables present a challenge. This is because some strings are stored in the BASIC program itself and might be moved or changed during editing.

For such strings, the first seven characters are also copied into free memory so they can be checked later. If you have plenty of memory available, you can increase this by changing the 7 in Line 100 of the listing to a larger value. Strings of up to six characters are stored in full.

The code is position-independent and can be stored anywhere in memory. Users with only 16K of memory should change the `32261` to `15877` in lines 10 and 20. Make sure you have saved the loader program before you try to execute the code because an error in typing in the data might cause you to lose everything.

Mike Moore is a math professor who divides his spare time between soccer and working on his CoCo. Address questions and comments to him at 2 Aurora Circle, Nepean, ON, Cdn. 1K2G 0Z7.

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Once the code is installed, you can type `EXEC 32261` to see how it works. If there are no variables because a program has not been run, you get the message Nothing Saved. But if all is well, you simply get the message Saved. You are now free to change your program to see if you can restore the variables. If there is not much free memory (typing `PRINT MEM` tells you how much), you get either Not Enough Memory or Some Strings Lost as your message.

In the first case there is not enough space in memory, and the variables have not been saved. In the second case the numeric variables should be OK, but some of the strings may be lost. They might be recoverable, but there is no guarantee that all your original strings will come back when you try to restore the variables.

If you edit, delete or insert a line, you will find that BASIC no longer has any of your variables. Try adding the new line `0 REM NEW LINE` to your program and then check any variable. Nothing there? Try a second `EXEC`, and you should get the Restored message. You can check by printing any variable. If the memory area to which the variables were moved has been disturbed, you get a Cannot Restore message.

When you have typed in and run the loader program, save the code produced as a machine language program. For 32K users, `(C)SAVEM"VARKEEP",32261,32767,32261` does this, while 16K users should type `(C)SAVEM"VARKEEP",15877,16383,15877`.

The most useful function this program serves is that it enables you to chain programs.

Perhaps the most useful function this program serves is that it enables you to chain BASIC programs. That is, you can get one program to run another from disk and pass its variables to the new program. As an example, type in and save the following short program as `PRINTIT`:

```
10 EXEC32261
20 PRINT I : FOR I=0 TO 9 : PRIN
TA(I); : NEXT
30 PRINT : PRINT C$
```

Next, type in and run:

```
10 C$="CHARACTER"+""
20 FOR I=0 TO 9 : A(I)=2*I : NEX
T
30 EXEC32261 : LOAD "PRINTIT",R
```

You get the Saved and Restored messages, and the values of the variables are displayed. Note that although `PRINTIT` does not define any variables, executing `VARKEEP` to keep and restore the variables allows their values to be passed to the second program.

I have one word of caution here: Notice that `C$` is defined in a seemingly odd way. This is to force BASIC to store `CHARACTER` in the string space. If you leave out the +"", then `C$` is kept in the program. Loading in `PRINTIT` overwrites the original and produces a Strings Lost message when `VARKEEP` tries to restore the variables. ☐

16K Extended

120	56
180	40
230	79
270	69
320	123
360	160
END	61

The Listing: `VARKEEP`

```
0 'COPYRIGHT 1989, FALSOFT, INC.
10 CLEAR200,32261 : REM VARKEEP
LOADER BY MIKE MOORE
20 S=32261
30 E=S+432
40 FORA=S TO E
50 READ B:POKEA,B:C=C+B
60 NEXT
70 FOR E=1 TO 5 : READ A$
80 FOR B=1 TO LEN(A$) : POKE A,A
SC(MID$(A$,B,1)) : A=A+1 :NEXT
90 POKE A,13 : A=A+1 : NEXT
100 IF C=38627THENPRINT"DONE"ELS
EPRINT"BAD DATA
110 DATA 49, 141, 1, 6, 134, 7,
183, 2, 11, 166, 164, 111, 164,
183, 2
120 DATA 10, 39, 61, 48, 232, 16
0, 156, 31, 16, 47, 0, 166, 175,
 33, 220
130 DATA 27, 147, 31, 38, 11, 10
8, 164, 237, 35, 49, 141, 1, 179
, 22, 0
140 DATA 153, 48, 139, 175, 35,
174, 33, 222, 31, 166, 194, 167,
 130, 17, 147
150 DATA 27, 46, 247, 220, 29, 1
47, 27, 48, 139, 175, 37, 220, 2
7, 195, 0
160 DATA 32, 253, 2, 0, 174, 37,
 52, 16, 174, 35, 39, 50, 31, 18
, 182
170 DATA 2, 10, 38, 9, 51, 141,
0, 225, 127, 2, 9, 32, 4, 51, 14
1
180 DATA 0, 103, 255, 2, 3, 173,
 159, 2, 3, 49, 141, 0, 148, 238
, 33
190 DATA 255, 2, 5, 16, 174, 37,
 182, 2, 10, 38, 10, 51, 141, 0,
 194
200 DATA 32, 8, 108, 164, 53, 14
4, 51, 141, 0, 71, 255, 2, 3, 16
, 188
210 DATA 2, 5, 44, 26, 236, 34,
51, 171, 239, 228, 109, 33, 42,
11, 166
220 DATA 36, 72, 139, 5, 49, 166
, 173, 159, 2, 3, 16, 174, 228,
32, 224
230 DATA 182, 2, 10, 39, 88, 49,
 141, 1, 41, 141, 8, 53, 160, 10
8, 164
240 DATA 49, 141, 1, 5, 166, 160
, 173, 159, 160, 2, 129, 13, 38,
 246, 57
250 DATA 109, 33, 49, 34, 42, 33
, 238, 34, 17, 147, 27, 46, 26,
230, 164
260 DATA 39, 22, 241, 2, 11, 47,
 3, 246, 2, 11, 80, 48, 133, 80,
 90
270 DATA 166, 197, 167, 133, 90,
 42, 249, 108, 36, 49, 37, 16, 1
72, 98, 45
280 DATA 1, 57, 188, 2, 0, 47, 5
2, 110, 159, 2, 3, 1, 59, 55, 59
290 DATA 20, 59, 55, 49, 141, 25
5, 245, 108, 164, 174, 35, 222,
27, 166, 128
300 DATA 167, 192, 172, 33, 45,
248, 223, 31, 236, 37, 163, 35,
211, 27, 221
310 DATA 29, 50, 126, 182, 2, 9,
 38, 6, 49, 141, 0, 121, 32, 4,
49
320 DATA 141, 0, 124, 23, 255, 1
34, 53, 176, 166, 33, 49, 34, 42
, 50, 166
330 DATA 36, 39, 46, 74, 38, 82,
 167, 36, 191, 2, 7, 222, 27, 23
0, 164
340 DATA 241, 2, 11, 47, 3, 246,
 2, 11, 247, 2, 2, 166, 130, 161
, 194
350 DATA 39, 29, 17, 147, 25, 46
, 247, 124, 2, 9, 190, 2, 7, 246
, 2
360 DATA 2, 80, 48, 133, 49, 37,
 16, 172, 98, 45, 1, 57, 110, 15
9, 2
370 DATA 3, 255, 2, 0, 90, 39, 1
7, 166, 130, 161, 194, 39, 247,
254, 2
380 DATA 0, 190, 2, 7, 246, 2, 2
, 32, 198, 239, 34, 32, 217, 49,
 141
390 DATA 255, 100, 108, 164, 49,
 141, 0, 64, 50, 100, 22, 255, 2
2
400 DATA restored,SOME STRINGS l
ost,NOT ENOUGH memory,nothing sa
ved,cannot restore
```

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UPS 2ND DAY AIR

How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with `ORIGIN` or `EQUATE` statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I, VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: `CMDS` and `SOURCE`. It also contains a file, `read.me.first`, which explains the division of the two directories. The `CMDS` directory contains executable programs and the `SOURCE` directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the `SOURCE` directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the `CMDS` directory, enter `dir cmds`. Follow a similar method to see what source files are in the `SOURCE` directory.
5) When you find a program you want to use, copy it to the `CMDS` directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/`*filename* `/d0/cmds/`*filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/`*filename* `/d0/cmds/` *filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal

RAINBOW
CERTIFICATION
SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

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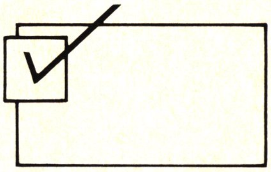
The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command `RUN` and press ENTER. Once the program has run, type `NEW` and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

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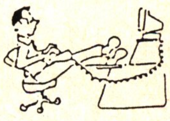

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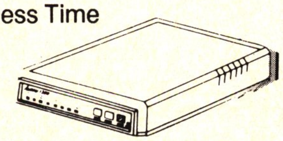

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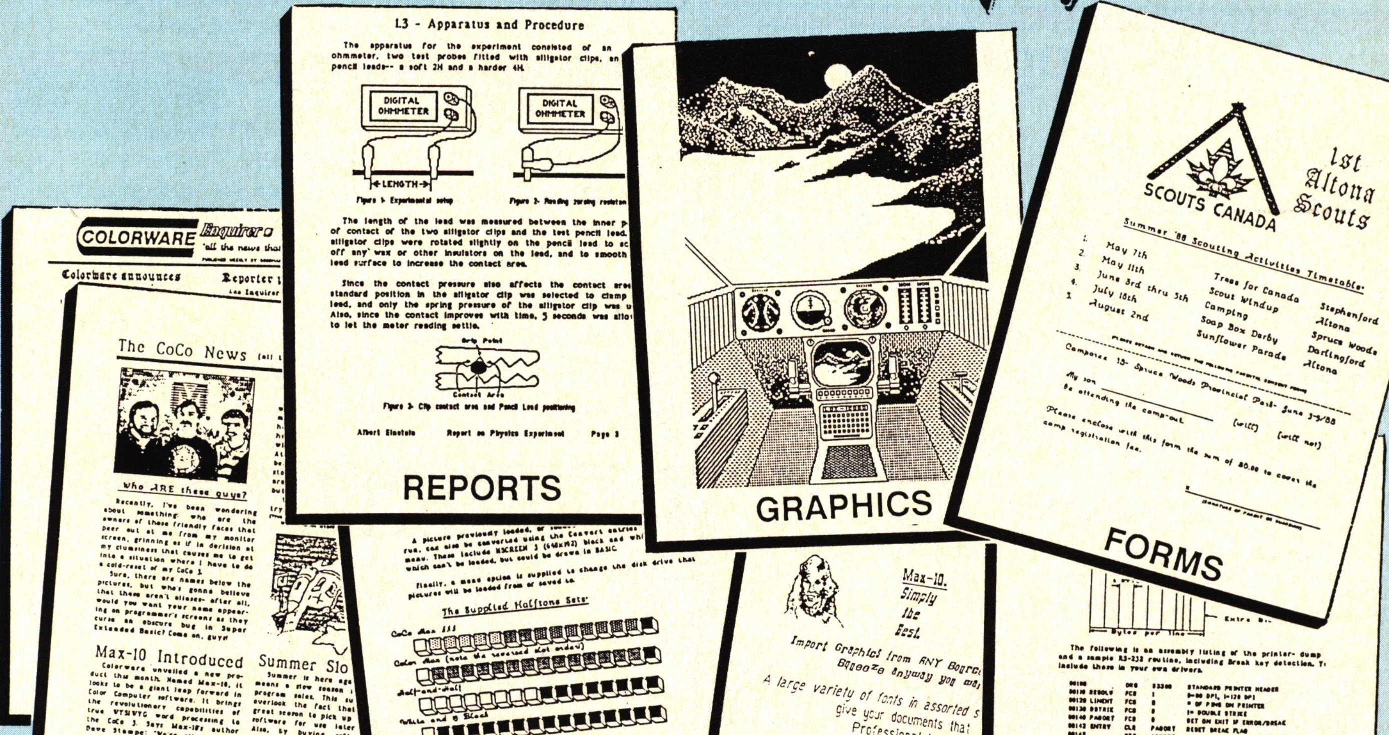

L3 - Apparatus and Procedure

The apparatus for the experiment consisted of an ohmmeter, two test probes fitted with alligator clips, an pencil leads-- a soft 2H and a harder 4H.

DIGITAL OHMMETER

LENGTH

Figure 1- Experimental setup

Figure 2- Reading zeroing resistan

The length of the lead was measured between the inner p of contact of the two alligator clips and the test pencil lead. alligator clips were rotated slightly on the pencil lead to sc off any wax or other insulators on the lead, and to smooth lead surface to increase the contact area.

Since the contact pressure also affects the contact area standard position in the alligator clip was selected to clamp lead, and only the spring pressure of the alligator clip was u Also, since the contact improves with time, 5 seconds was allo to let the meter reading settle.

Grip Point

Contact Area

Figure 3- Clip contact area and Pencil Lead positioning

Albert Einstein Report on Physics Experiment Page 3

SCOUTS CANADA

1st Altona Scouts

Summer '88 Scouting Activities Timetable:

1.	May 7th	Trees for Canada	Stephenford
2.	May 11th	Scout Windup	Altona
3.	June 3rd thru 5th	Camping	Spruce Woods
4.	July 16th	Soap Box Derby	Darlingford
5.	August 2nd	Sunflower Parade	Altona

Camporee 13- Spruce Woods Provincial Park- June 3-5/88

My son ______________ (will) (will not) be attending the camp-out.

Please enclose with this form the sum of 80.00 to cover the camp registration fee.

X ______________

COLORWARE Enquirer

'all the news that

Colorware announces

Reporter

The CoCo News

Who ARE these guys?

Recently, I've been wondering about something: who are the owners of those friendly faces that peer out at me from my monitor screen, grinning as if in derision at my clumsiness that causes me to get into a situation where I have to do a cold-reset of my CoCo 3.

Sure, there are names below the pictures, but who's gonna believe that these aren't aliases- after all, would you want your name appearing on programmer's screens as they curse an obscure bug in Super Extended Basic? Come on, guys!

Max-10 Introduced

Colorware unveiled a new product this month. Named Max-10, it looks to be a giant leap forward in Color Computer software. It brings the revolutionary capabilities of true WYSIWYG word processing to the CoCo 3. Says Max-10's author Dave Stampe: "We're all tremendously excited by this product, and feel the CoCo users will be, too.

Summer Slo

Summer is here aga means a slow season program sales. This su overlook the fact that great season to pick up software for use later Also, by buying softw round, you can increase t of new programs for Computer by encouraging p

---

A picture previously loaded, or run, can also be converted using the Convert entries menu. These include HSCREEN 3 (640x192) black and whi which can't be loaded, but could be drawn in BASIC.

Finally, a menu option is supplied to change the disk drive that pictures will be loaded from or saved to.

The Supplied Halftone Sets:

CoCo Max III

Color Max (note the reversed dot order)

Half-and-Half

White and 8 Black

Some Sample Pictures:

From the desk of Dave Stampe

TO:

WANTED

Dave Sto

Written and © 1988 by Dave Stampe

Max-10. Simply the Best.

Import Graphics from ANY Source

Squeeze anyway you wa

A large variety of fonts in assorted s give your documents that Professional Look.

Use multiple fonts and styles any

Yeehaa! Y'all come to the Wild West

Use up to three columns per page. Create special effects and overlays. True WYSIWYG lets you see before you print!

50,000 word sp too. Create posters or long with equal ea won't believe y

---

Extra

Bytes per line

The following is an assembly listing of the printer- dump and a sample RS-232 routine, including Break key detection. Y include these in your own drivers.

```
00100         ORG    $3300    STANDARD PRINTER HEADER
00110 RESOLV  FCB    1        0=80 DPI, 1=120 DPI
00120 LINCNT  FCB    8        # OF PINS ON PRINTER
00130 DSTRIK  FCB    0        1= DOUBLE STRIKE
00140 PABORT  FCB    0        SET ON EXIT IF ERROR/BREAK
00142 ENTRY   CLR    PABORT   RESET BREAK FLAG
00143         STS    ABORTS   SAVE STACK FOR BREAK EXIT
00144         JMP    INTERP   GO TO DRIVER INTERPERTER (D-opcode)
00145 ***** RS-232 OUTPUT ROUTINE *****
00150 PBYTE   ORCC   #$50     RS232 OUT
00160         PSHS   X,B      SAVE X
00170 BTEST   LDB    #$FB
00180         STB    $FF02    BREAK KEY TEST
00190         LDB    $FF00
00200         BITB   #$40
00210         BNE    OBYTE
00220         COM    PABORT   SET BREAK FLAG
00230         LDS    ABORTS   ABORT PRINTOUT
```

© 1988 by Dave Stampe Page 10

Mr. Don Kenski
Northwest Regional Sales Manager
Computer Supplies
1223 NE 43th Ave.
Sunville, Canada

Dear Don

Congratulations!

Your hard work during the past few months has resulted in th successful 3-month sales period in the history of Computer Suppl

3rd Quarter Sales:

Northeast
South
West Coast
Southwest
North
Midwest

As anticipated, the sales of computer supplies have continued to climb.

Item	April	May	June	TOTALS
Copier supplies				
Computer supplies				
Typewriter supplies				
Mailroom supplies				
TOTAL SALES:	$131,345.98	$138,399.84	$163,559.44	$475,303

Sincerely,

Joe Hanson

President, Computer Supplies Inc.

Professor EinsTin Develops New Anti-Twinkie Formula!

You have no doubt heard about the new threat to Cankind. That's right, the vicious Killer Twinkies are loose! Originally held in research laboratories for study, the awful creatures are now making their way north to prey on the innocent Tin Can population of America. Most of you probably thought there was nothing anybody could do. But Professor EinsTin thinks there may be hope. Through careful research and study, he has developed a special weapon to use against the incoming destroyers. To use against the incoming twinkie menace, we now have the awsome Twinkie-be-Gone©! The Twinkie-be-Gone© consists of a pump gun attached to a tank that holds the Professor's secret formula. When the trigger is pulled, the gun will spray the formula and will instantly disinegrate any Killer Twinkie that happen to come your way! The Twinkie-be-Gone© comes with easy-to-follo instructions so you will be ready in no time. To order yo Twinkie-be-Gone©, send $19.95 to:

Twinkie-be-Gone©
4478 Hostess Bvd.
Nome, Alaska 48203

The Twinkie-be-Gone

anti-twinkie formula storage tank

spray n

delivery tube

rear handle

front handle

CTRL arrow key and the ALT key useful (about 1/4

ing Features

major upgrade is the ability to use columns in your printed output. Two or three columns can be used, either automatically or as page overlays. These allow very sophisticated output to be printed.

Offset & Overlay

Printout or Page Preview

3 sequential "pages"

Columning in Max-10 works by "overlaying" several pages. An offset for the second and (optionally) the third page makes one

twice for the second the offset is for the third column.

Deciding on the proper settings for columning takes a little calculation. For example, let's say you wanted 1" left and right margins, and a ¼" gap between 2 columns. We can figure the width of the columns and offset like this:

The page is 8½" wide, and we have 2x1" margins, which leaves 6½" for the columns. Subtracting the ¼" gap between columns leaves 6¼" for the columns themselves. Dividing by the number of columns (2) gives us 3⅛" for the column width, so we set the right margin on our ruler to 1"+3⅛", or 4⅛". The left margin on the ruler is the same as the page left margin— 1".

The column offset is the column width (3⅛") plus the gap between the columns (¼") or 3⅜".

Max-10 Upgrade Supplement 6/6/88 Page 2

Simply the Best

Alone, they're simply amazing. Together these two make an unbeatable team. CoCo Max III and Max-10: there's strength in numbers. Thousands of Color Computer enthusiasts the world over agree: this must be seen to be believed. CoCo Max has been used to draw so many pictures in Rainbow magazine that we've lost count of them all. And Max-10 is just the tool to write the thousand words that you know your CoCo Max picture is worth.

COLORWARE

Have a Super CoCo Christmas !

With these great bargains:

Max-10™

The Dazzling Word Processor

~~$79 95~~ now $39 95

CoCo Max III

The Famous Graphics Creator

~~$79 95~~ now $49 95

Save $70

BOTH

CoCo Max III and Max–10 for

~~$149 90~~ now $79 95

Max–10: the Rolls–Royce of word processors. The only one with true graphic capability and dozens of type styles. Using your dot matrix printer you get from tiny footnotes (6 point) to big titles (24 point).

The *Rainbow* review (1/89) said: **"An incredible job of providing power, flexibility and speed in a program that is as easy to use as it is to pronounce! ... Max–10 takes a back seat to none, and is beyond comparison with most."** Max–10, the only word processor with **"What You See is What You Get"**. A word processor you will love at first sight.

CoCo Max III: now a classic and probably the most popular CoCo program ever. If the price was the reason that stopped you before, this *special* will delight you. Listen (*Rainbow* 3/88): **"There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. CoCo Max III is the ultimate program for the CoCo 3."** Check any Rainbow (up to 4/89) for complete info on CoCo Max.

To top it off, we include a free **Demo Disk** plus the super **CoCo Show** program, which lets you make your own "slide shows".

Desktop Publishing: together, **CoCo Max III** and **Max–10** form an unbeatable system for reports, flyers, invitations, greeting cards, signs, newsletters, etc. It's far beyond anything you've ever seen on a CoCo.

Here is one of the hundreds of unsolicited letters we got: **"Max–10 and CoCo Max III are wonderful. They are the first Color Computer products I have purchased that were even better than I hoped for."**

At **Colorware**, we all work hard to make you feel that way and we thrive on your appreciation.

FREE CHRISTMAS BONUS

Get any one of the "Add–Ons" below free with CoCo Max III or Max 10.

Select one of these: Max Fonts, Max Edit, the Color Drivers, the Spellchecker, the Max–10 Fonts, or the Hi-Res Pack. If you get both Max–10 and CoCo Max III, select any **two** free add–ons!

About Max–10

What the CoCo Community needs is a word processor that's rock solid, blindingly fast, feels like a Macintosh, makes all the others look boring, and does not cost $80.
Max–10 is just that and more. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview (with graphics).
We swear that Max–10 will add excitement to your word processing, and that's no small task!

PRINTERS SUPPORTED: EPSON FX,MX,RX,LX AND COMPATIBLES; DMP 105,106,110,130; CGP220 (B&W); OKI 182,92,192; STAR NX-10, NX-1000.

Max–10 Add-ons

– **Max–10 Fonts**. 36 super fonts on 2 disks. Send for list. Order #C–23 .... **$29.95**

NOTE: Max–10 and CoCo Max Fonts aren't interchangable.

– **Spell Checker** 50000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max–10. Order #C–24.. **$29.95**

System Requirements

Max–10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

About CoCo Max III

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise.
Its major features include: Huge picture area (2 full hi-res 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation**. Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull–down menus. **40 paint brush** shapes. Two color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.

PRINTERS SUPPORTED: EPSON RX,FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX–10,NX–1000; DMP100,105,106,110,120,130,200; OKI 82A,182,192; CGP–220(B&W)

Color Drivers available. See next column.

CoCo Max III Add-ons

– **Max Fonts** disks. 95 fonts on 4 disks. Order #C–73.. **$49.95**

– **Max Edit** Create new fonts or edit existing ones. Order #C–16 .... **$19.95**

– **Color Printer** drivers NX–1000 Rainbow, CGP–220 and Okimate 20. #C–2 ...... **$19.95**

CoCo Max I and II

– **CoCo Max I on tape**. See previous ads or write for info. For CoCo 1 or 2. Order #C–7.. **$59.95**

– **CoCo Max II**. For all disk CoCos. Multi–pak or Y–Cable required. #C–85....... **$69.95**

Digitizers

Digitize any picture from any video source (VCR, camera...) for use with CoCo Max III and Max–10.

DS–69. Requires Multipak. 2 pictures per second. Order #C–18......................... **$99.95**

DS–69B Faster: 8 pix/sec. #C–92... **$149.95**

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COLORWARE

Colorware
242–W West Ave.
Darien, CT 06820

The Disk System That Lied

by Marty Goodman
Contributing Editor

My FD-501 drive system has been intermittently, falsely telling me my disk is write-protected and refuses to write to the disk. I sent the controller and drive to Radio Shack. They tested it and said it was OK. What should I do?

Douglas Paulson
Richfield, Indiana

Until the system "stays broken" and until it *always* gives you a WP Error, it may be tough to fix. However, there are some things you can try: Borrow another drive and controller, and run your CoCo with your controller but with another drive and cable. Then try it with your drive and cable but with another controller. See if the problem occurs only in one combination of hardware, but not another. This allows you to narrow down the problem to which component it resides in. The problem could be a faulty write-protect sensor on the disk drive — perhaps cold solder connections for that sensor or dirty contacts for the cable. It could also be a defective cable or a bad junction between the cable and its connectors, or, less likely, a faulty chip or cold solder joint in the disk controller. Tracking down such intermittent problems requires a lot of time and patience — time that repair techs, who may charge $50 an hour, could only fix for several hundred dollars.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's *CoCo SIG and database manager of OS-9 Online. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

Modem Vs. Printer

I've been told on Delphi that it is impossible to write terminal programs that use the internal serial port with a modem at over 2400 baud and over 300 baud under OS-9. Yet I know a CoCo 1 or 2 can talk to a printer through the serial port at 9600 baud, and a CoCo 3 can do so at 19,200 baud. Why is the speed at which the internal serial port can be used with a modem so different?

Doug Fischer
(COCONAUT)
Hempstead, Maryland

When the CoCo talks to a printer, data is flowing in only one direction — from the computer to the printer. It's true that the

GIME the Interrupts

In the November 1989 issue we published the article "The OS-9 *CART Interrupt Fix," by Marty Goodman. Shortly thereafter we received news from Tandy claiming the information in that article was untrue. According to Tandy, the GIME chip contains a very sophisticated interrupt handler utilizing a state-of-the-art interrupt polling methodology used by mainframes and real-time robotic control processors. By definition, an interrupt is an asynchronous process, meaning there is no way to determine when such an event will occur. Therefore, if you can't anticipate an event, you can't judge when to select a slot for the event to come in on. Instead, you must predefine the slot and make all interrupts channel through a single slot.

The theory behind the GIME chip allows it to detect and react to simultaneous interrupts from multiple sources with relative ease. When an interrupt is detected, the proper method of handling it is as follows:

1. Read the GIME to find the source.
2. Reset the GIME for next interrupt.
3. Poll all potential interrupt devices.
4. Return from interrupt.

When you reset the GIME, any additional interrupts are held in a pending state. If additional interrupts are generated, they will either be picked up as you poll the device or become pending and will trigger an active interrupt as soon as you return from the current interrupt routine. With this technique, you can handle interrupts from multiple sources without performing any modifications to your system.

The modification presented in the November article merely provides a means of getting around a problem with OS-9 Level II's interrupt-handling routines. A better solution is to use software that properly handles the interrupts. Tandy advises against any internal modifications to the Color Computer 3 as this can cause failure to comply with FCC Class B specs, damage to the unit, and possible injury to the user.

We will soon feature an in-depth article in which we will cover the ins and outs of handling interrupts with the GIME chip and the methods used by OS-9 Level 2 that differ from Tandy specifications.

— RAINBOW staff

printer communicates its busy status to the computer via a busy line, but the computer needs to check the status of that line to see if it is high or low. There is no interpretation of incoming serial data. This one-way communication is called *half duplex*.

When using a terminal program with a modem, you need to be able to send and receive serial data at the same time. This is called *full duplex* communication. Coding the serial port to do this is much trickier than coding it for outgoing half duplex communication. It takes more of the computer's processing time. Note that when the internal serial port is programmed to receive data, this task is especially demanding of processor time — one has to poll the port (check it repeatedly) for new data all the time.

The designers of the CoCo 3 realized that this polling made coding for the internal serial port a problem, so they built a serial data input interrupt into the `GIME` chip, intending the code to be interrupt-driven, and thus easier and faster. Also both the higher processor speed of the CoCo 3 and its internal timer allow for somewhat faster operation of the serial port on the CoCo 3 than is possible on the CoCo 1 and 2.

OS-9 Level 2 cannot support full duplex on the serial port because OS-9 is doing too many other things at once (as a multitasking system) to be able to devote constant attention to the serial port. Thus under OS-9, use of a hardware RS-232 port is required for full-duplex communication.

Managing Memory

I have three questions: How does the memory management unit (MMU) of the CoCo 3 work? When you alter the contents of $FFA0 through $FFA7, why are you likely to crash programs running under BASIC or OS-9? What other registers are involved in memory management?

Matthew James Randall
Calgary, Alberta,

The best technical references for the functioning of the MMU is Tandy's service manual for the CoCo 3 and Spectral Associates' *Super Extended BASIC Unravelled.* (Both are available from RAINBOW advertisers.) Bit 6 of Register $FF90 enables the MMU. Bit 3 of $FF90 determines whether or not $XFEXX is constant or varied by the MMU registers. Bit 0 of $FF91 is the task register select bit that selects between the memory scheme represented by $FFA0 through $FFA7 and the memory scheme represented by $FFA8 through $FFAF. The first six bits of registers $FFA0 through $FFA7 represent what portion of the actual 128K or 512K of physical RAM will be mapped into the address space of the 6809 for Task 0. Similarly the first six bits of $FFA8 through $FFAF determine memory mapping for Task 1. Note that (though this is not documented anywhere) the MMU registers have an effect not only on memory mapping but also on the mapping of the BASIC ROMs. More details are provided in the two references I mentioned.

Need to Make Some Repairs

How do I go about fixing a Radio Shack disk controller?

Duane Fair
Joshua, Texas

The most common problem with CoCo disk controllers is that the 7416 or 7406 chip connected to the *HALT and *NMI lines go sour. Controllers with this problem usually lock up the computer when plugged in. The cure is to desolder the defective chip, replace it with a socket, and put a new 7406 in the socket. I suggest replacing an old 7416 with a 7406, which is a more rugged chip.

Sometimes the problem is in other logic chips connected with the *HALT and *NMI circuitry. Rarely does the disk controller chip go bad. If it does, you can get replacement chips from Tandy National Parts. For the newer CoCo controllers, Disto/CRC offers the WD1773 (28-pin) disk controller chip.

Apart from these tips repairing the controller is like repairing any other electronic circuit: You get a schematic, examine it, then use test equipment to help find the trouble and fix it.

Hooking Up Floppies

Can I connect a 5¼-inch floppy drive to my CoCo as Drive 0 and a 3½-inch floppy drive as Drive 1?

Toby Johnson
New Albany, Indiana

Yes. Electrically 5¼-inch 360K drives are identical to 3½-inch 720K drives. Your problems will be making proper data cables (the 34-pin connectors on the two drives are physically different, even though the lines are the same), making proper power connectors (3½-inch drives use a different type of power connector, even though they take the same voltages) and setting up the software to use both sides and all tracks of

RGB-DOS Hard Disk Operating System **$29.95**
Supports up to 16 Hard Drives. Runs Double Sided Floppy drives. Adds many new commands. Best compatibility with Basic and M/L. Works on any COCO. FREE Ramdisk for 512K COCO-3 included!

OS-9 Hard Disk Drivers PLUS Hard Disk Boot **$19.95**
Run your Hard Disk under OS-9 Level 2. Boot up OS-9 directly from Hard Disk. Supports up to 16 Hard Drives. FREE utilities.

Ultra Basic 3 **$19.95**
Adds many new commands and functions to the Color Computer 3 including support of Real Time Clocks such as the KEN-TON, DISTO and TANDY SmartWatch, RS Catalog # 25-1033

20 Meg Hard Disk system, complete **$629.95**
Fast, Reliable SCSI hard disk system. Complete, ready to run. No setup is required. Just plug and go. Completely Brand New components. No refurbs or scrap. Full manufacturers warranty. Supports your choice of Disk Basic, OS-9 or BOTH!

30 Meg Hard Disk system, complete **$669.95**

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Ken-Ton SCSI Hard Disk interface **$89.95**
The only TRUE SCSI interface available for the Color Computer. Low power draw, very high speed. Compatible with Basic and OS-9. No multi-pack required. Jumper selectable options.

Ken-Ton SCSI Interface PLUS RTC **$119.95**
Same as above, with battery backed Real Time Clock, perfect for OS-9, Basic or a Bulletin Board System.

Ken-Ton RS-232 Pack **$74.95**
Direct replacement for Tandy RS-232 pack. No multi-pack or software patches required. Very low power draw. Supports the TANDY SmartWatch Real Time Clock. Add Real Time to your BBS!

Ken-Ton RS-232 pack, DUAL Channel **$89.95**
Same as above, with two RS-232 ports. Perfect for OS-9, remote terminals or multi-line Bulletin Board Systems.

Please add $4 shipping per item. (Hard Drive Systems, add $20)

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Kenmore, N.Y. 14217
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RAINBOW
CERTIFICATION SEAL

the drives in question. Under OS-9 this is easy. Under Disk Extended Color BASIC (also called RS-DOS), I recommend buying *ADOS* or *RGB DOS* and burning it into an EPROM. Note that under Radio Shack's Disk BASIC you must define one side of a double-sided drive as one virtual drive and the other side of it as a different virtual drive.

Memory Upgrade

How do I upgrade a CoCo 2 Model 26-3134 to 64K?

James L. Fisher
Laurel, Missouri

I suggest reading an article I wrote in the March 1989 issue of THE RAINBOW called "Upgrading the Color Computer's Memory" (Page 34). To upgrade that model of computer, you need eight 4164-type DRAM chips (-20 or -15 speed). Just replace the eight socketed 16K-by-1 RAM chips with those eight 64K-by-1 DRAM chips, and solder the two 64K jumper pads located in the front left part of the motherboard to each other. You may have to upgrade the ROM to go from Color BASIC to Extended Color BASIC. Several RAINBOW vendors sell the needed Extended BASIC chip. My article describes exactly what chip to get and how to install it. Before you do all these things, you might want to look for a 64K CoCo 2 at local flea markets. Often these used machines sell for less than the cost of the individual parts needed to upgrade a 16K machine.

McGinnis Asks About Bradley

Can I use an Allen Bradley Cat. No. L1745-MC EPROM memory module with a 512K Color Computer?

B. McGinnis
Wentzville, Missouri

Probably not. Only EPROMs specifically designed electrically for the Color Computer with programs specific to the Color Computer will work with it.

Downloading With the DCM Pak

How can I download with my Direct Connect Modem Pak, CoCo 2, disk drive and Multi-Pak? I have Videotex Software.

Wes Day
Willard, Missouri

You can use the DCM Pak with other software, such as *MikeyTerm*. The Videotex software is worthless for downloading, as is the internal software in the DCM Pak. *MikeyTerm* can be ordered for $10 from its author, Mike Ward, at 1807 Cortez, Coral Gables, FL 33134. Once it is up and running, you will find other CoCo 2 terminal programs for downloading.

I also suggest reading "Working Together: Delphi and Tape I/O" by Don Hutchison on Page 156 of the August issue. It discusses how to download with the Direct Connect Modem Pak.

Finally, if you plan on doing much downloading, let me advise you to get rid of the DC Modem Pak and invest in a 1200-baud modem.

Looking for an Address

I'm having trouble finding the end address of disk-based machine language programs. I need this to back up some disk programs to tape.

Donald Kempton
Athens, Ohio

The end address is not stored in memory when you load a disk-based machine language program into memory. Rather, it is determined by the length of the program. Some programs in THE RAINBOW assist with the transfer of machine language programs from tape to disk and disk to tape, such as the one found in the article, "The Limosine Utility: A Tape to Disk Transfer Vehicle" by Roger Schrag (RAINBOW, February 1987, Page 73). In any case it is a waste of time to back up disks to tape. The sensible way to back up information on a floppy disk is to put that information onto another floppy disk. There is no advantage to using tape.

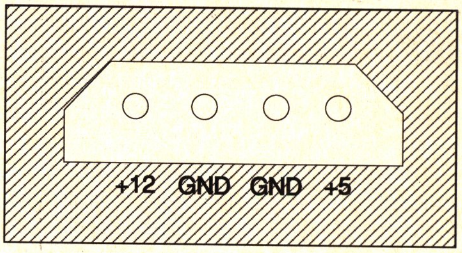
Cabinet Query

I was trying to add a second disk drive to my FD-502 Radio Shack disk drive cabinet, but the power supply connectors used on the FD-502 drive inside the cabinet are non-standard. What should I do?

Walt Jones
Georgetown, Delaware

I believe the power connector used by the FD-502 5¼-inch drive is actually the same as the standard power connector for 3½-inch disk drives. In any case disk drives require regulated +5, regulated +12 volts and ground. You need to buy a standard 5¼-inch-drive-type, Amphenol 4-pin female connector (the type used to hook to the power connector of most older 5¼-inch drives). Cut off the old connector that came on the FD-502 system for its spare drive, and solder the wires to the normal Amphenol power connector. Radio Shack does not sell such connectors, but many other electronic supply houses do. Try Jameco in Belmont, California, or JDR in San Jose.

Be sure to hook the power up correctly. The two middle wires are ground. If you look at the standard female power connector (the one that will plug into the drive) head on (*into* the end that mates with the connector on the drive), it must be wired as follows:



Use a voltmeter to be sure of the voltages on the wires coming from the FD-502's power supply.

How Compatible is Commodore?

Is it possible to hook up a Commodore-compatible printer (one with a six-pin serial port) to a Color Computer 3's built-in serial port?

Wayne Smith
Winnipeg, Manitoba

No. The Commodore computers use a non-standard serial port operating at differing voltage levels from those of the CoCo 3 (which are within the industry standard for RS-232 signals.) Offhand I know of no commercially available converters. A hacker might try to rig up something using 1488 and 1489 level converter chips or a MAX232 level converter chip, assuming there are no other incompatibilities (such as timing).

Do I Have 64K Memory?

I have a Radio Shack Color Computer 2 with Extended Color BASIC. How much memory do I actually have? What chips do I need to upgrade my CoCo 2?

Sabine Foulds
Quadra Island, British Columbia

Most CoCo 2s with Extended Color BASIC come with 64K. After powering up the computer, type `PRINT MEM` and press ENTER. If the result is 22823 with a disk controller plugged in or 24871 without a disk controller plugged in, you have a 64K machine. BASIC is able to use less than half the total amount of RAM in a 64K machine for its programs and data.

Many commercial and shareware programs, however, use all of the 64K available RAM. If you get a much smaller number as free memory, you can upgrade your machine to 64K. The exact procedure and chips required vary with the particular issue of CoCo 2. I gave a complete guide to all such upgrades on Page 34 of the March

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A Truly Compatible RS-232 Interface!
It comes with a 3 foot DB25 cable, gold edge contacts, and low power drain (5v) components.

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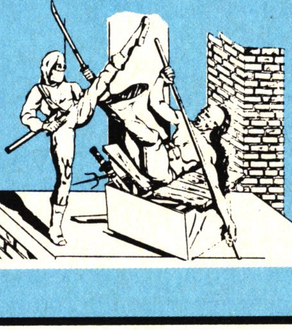

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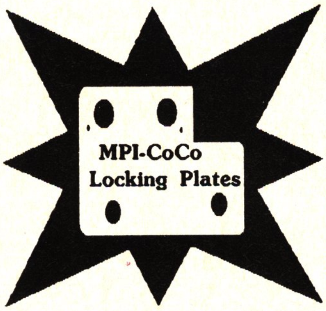

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1989 issue of THE RAINBOW.

New Drives, Old Case

What are the power requirements for 3½-inch drives, and will they fit in an old Radio Shack full-height case? Could the power supply in that case drive both of them without being overloaded?

Doug Fischer
Hempstead, Maryland

3½-inch drives require regulated +5 and +12 volts. Just like 5¼-inch drives, they tend to draw somewhat less current on both of those lines, especially when compared to the ancient full-height 5¼-inch klunkers. This is due to the use of LSI circuitry and more efficient motors. The exact power requirements vary a bit from brand to brand, and there are several different power supplies used in old RS full-height drive cabinets, so I cannot give you a precise answer. It seems likely that the power supply designed to drive a single full-height 5¼-inch drive will drive two 3½-inch drives. You need adapters for the power connectors, though, because 3½-inch drives use a different connector for their power supply. Adapters going from a 5¼-inch drive power connector to 3½-inch-type power connectors are sold by JDR Microdevices of San Jose, California. The 3½-inch drives also use different data connectors, though the required connector is sold by Radio Shack stores. The data and control lines are identical to those of comparable 5¼-inch drives. There is far less standardization of size and mounting hole positions with 3½-inch drives, so you will probably have to drill custom mounting holes and use metric screws to mount the drives. Many 3½-inch drives are *half-height* (by the old 5¼-inch standards), but some are *third-height*, especially those intended for mounting in laptop/portable computers. You might want to use a bit of black plastic or paper to plug the hole between the drives and the top of your old case at the front of the case.

CoCo With DOS on It

Can I run MS-DOS programs on a CoCo? Can I use a DC Modem Pak for downloading ASCII graphics?

Reuben Rivas
Ontario, California

Generally speaking, you cannot run programs written for MS-DOS systems on a Color Computer. The CoCo uses a different central processor and different operating system and has utterly different keyboard and screen characteristics from MS-DOS machines. Usually the DC Modem Pak is a bad choice for any sort of telecommunications. If you have one, don't use the program that comes with it, but get other terminal programs to use with it, such as *MikeyTerm*. (See my response to James Fisher for more information.)

With *MikeyTerm* you can download other shareware terminal programs from Delphi. Or as you become more skilled at using such programs, you may prefer to buy one of the excellent and relatively inexpensive commercial CoCo terminal programs like *V-term* (for the CoCo 3) or *Autoterm*.

Attention, All 40-Tracks

How can I address all 40 tracks (not just the first 35) of my FD-501 drives under Disk BASIC? Is there some simple poke I can use with Disk BASIC in the all-RAM mode? What about 80-track drives and hard drives?

Timothy G. Fultz
Summerville, South Carolina

There is no simple modification or poke to convert to a greater number of tracks. But alternate DOSs such as *ADOS* and *RGB-DOS* give you the option of using higher-capacity drives. These DOSs can be burned into an EPROM and substituted for your Disk BASIC ROM once you have customized them to your liking. For general information about hard drives, I encourage you to read "A Hard Drive for Your CoCo" (March 1989, Page 44).

Mixing CoCo with Apples?

Can I use programs written in Apple BASIC on a CoCo?

Alan Pilon
Brossard, Quebec

BASIC on all microcomputers is similar but *not* identical. It is very unlikely that a program of any complexity written in BASIC for one type of computer will run without modification on another. The main problems tend to be due to the fact that the graphics display capabilities of personal computers are quite different. Hence, programs with graphics display (as opposed to text-only display) often require considerable rewriting when being ported over to another type of computer.

Maybe If I Took It to an Arcade

Is there anything I can do to a CoCo to enable it to play Nintendo games?

Rolf Schlup
Beausejour, Manitoba

There is no way to make a CoCo directly compatible with Nintendo cartridges. The two machines are different in almost every aspect of their design. However, you might see Nintendo software written for ROM Paks for the CoCo.

Alignment Problems

I just installed a second, double-sided disk drive in my FD-501 case along with the original FD-501 single-sided drive. It seems to work, but disks formatted and written with it cannot be read on the original drive and vice versa. What is going on here? Also, how can I address the other side of this double-sided drive?

Jason A. Weinstein
Martinez, Georgia

It sounds like one or both of the disk drives have serious head alignment problems. The two drives are writing tracks in somewhat different places on the disk, so one cannot read what the other has written and vice versa. Both need their alignment checked and adjusted. This requires an alignment disk, either an oscilloscope or a digital alignment adjustment program such as *Memory Minder* by J&M systems of Albuquerque, and some experience with aligning disk drives. As for accessing the back side of the drive, I recommend purchasing *ADOS* from SpectroSystems. Among many other things *ADOS* gives access to the back side of double-sided disk drives under Disk BASIC.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.

Free VIP Disk-ZAP With Every Order!

VIP Writer-VIP Writer III

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VIP Writer III comes with a configuration / printer installation program which lets you customize VIP Writer III to suit your own liking. You can set screen width and colors as well as margins and more. You can also install your own printer and set baud rate, line feeds, etc. Once done, you never have to enter these parameters again! VIP Writer III will load n' go with your custom configuration every time!

MORE TOTAL TEXT STORAGE

VIP Writer III has 106K total text storage in a 128K CoCo 3 (495K in 512K). VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII files. You can use VIP Writer III to even type BASIC programs! There is a 48K text buffer (438K in a 512K CoCo 3) and disk file linking allowing virtually unlimited text space. VIP Writer III works with up to four disk drives and lets you display directories and free space as well as rename or kill disk files. In addition VIP Writer III is 100% compatible with the RGB Computer Systems Hard Disk.

POWERFUL EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead • typamatic key repeat and key beep for flawless text entry • end of line bell • full four way cursor control with scrolling • top of textfile • bottom of textfile • page up • page down • top of screen • bottom of screen • beginning of line • end of line • left one word • right one word • DELETE character, to beginning or end of line, word to the left or right, or entire line • INSERT character or line • LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards • BLOCK copy, move or delete with up to TEN simultaneous block manipulations • TAB key and programmable tab stops • word count • line restore • three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and multiple copy printing.

AUTOMATIC TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! Parameters can be altered ANYWHERE !

PREVIEW PRINT FORMAT WINDOW

VIP Writer III features an exclusive format window which allows you to preview your document BEFORE PRINTING IT! You are able to move up, down, left and right to see centered and justified text, margins, page breaks, broken paragraphs, orphan lines etc.

PRINTING VERSATILITY

VIP Writer III prints TWICE as fast as any other CoCo word processor! It supports most printers and gives you the ability to select baud rates from 110 to 19,200. You can imbed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has TWENTY programmable printer macros which allow you to easily control all of your printers capabilities such as bold, underline, italics and superscript using simple key strokes. Other features include: multiple copy printing • single sheet pause • line feeds.

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VIP Writer III has a print spooler with a 57,000 character buffer which allows you to print one document WHILE you are editing another. You don't have to wait until your printer is done before starting another job! VIP Writer DOES NOT include this feature.

50,000 WORD SPELLING CHECKER

VIP Writer III includes VIP Speller (not FREEWARE) to check your text for misspelled words It has a 50,000 (not 20,000) word dictionary that can be added to or edited.

QUALITY DOCUMENTATION

VIP Writer III comes with a well written 125 page manual which is Laser printed, not dot-matrix like the competition. It includes a tutorial, glossary of terms and examples for the beginner as well as a complete index! VIP Writer III is truly the BEST you can buy.

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* VIP Database for CoCo 1 and 2	DISK $49.95

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For VIP Library shipping please add $4 USA. $5 Canada. $20 Foreign.

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SD Enterprises info line (805) 566-1317
P O Box 621 Carpinteria, Ca. 93013

Non VIP Library orders add $3 for shipping and handling in USA. Canada $4. Foreign $6. COD orders add an additional $2.75. Checks allow 3 weeks for delivery. California residents add 6% sales tax. * CoCo 1 & 2 versions support 51, 64 and 85 Cols.

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A keyboard supercharger that helps make CoCo user-proof

Harness Those Keys

by Mike Dalene

Have you ever wanted to write a game or word processing program? If so, you know how frustrating it can be when your computer has a BREAK key that halts everything you do. Even the best programmers and users press it by accident. I experienced a similar problem and so tried to figure out how to turn off and redefine the BREAK key. *KeyEdit* provides a simple but powerful way to shut off the BREAK key and any of the keys in Figure 1.

How It Works

Through the BASIC machine language loader at the beginning, this program puts the ROM data into RAM, then looks at the keyboard table for the "control" keys shown in Figure 1. It lets you redefine them for your own uses. For example, when I wrote this program, I changed the shifted left arrow to 8 instead of the original 21. That way I could not erase the entire line if I pressed SHIFT and the left arrow. (Instead, it now only deletes like the unshifted key.)

Mike Dalene uses BASIC and OS-9 on his CoCo 2. He is currently studying COBOL, FORTRAN and C, while living at home. He may be contacted at 39 Upland Rd., Winsted, CT 06098, (203) 379-0178.

Up Arrow	SHIFT-Up Arrow
Down Arrow	SHIFT-Down Arrow
Left Arrow	SHIFT-Left Arrow
Right Arrow	SHIFT-Right Arrow
Space Bar	SHIFT-Space Bar
0	SHIFT-0
ENTER	SHIFT-ENTER
CLEAR	SHIFT-CLEAR
BREAK	SHIFT-BREAK
@	SHIFT-@

Figure 1

The program is very easy to use and should not take too long to understand. Most of the commands are simple, although they may look awesome at first. *KeyEdit* is written in the form of subroutines, and it accesses these from the main menu. Most of the routines do not require much explanation, except for the Edit Keycodes and Print New Codes options. Edit Keycodes uses some strange-looking `CHR$` values for the cursor key controls. I wrote it like this because some users may have defined the cursor keys for values other than the original defaults. The values are obtained from the key redefinition area of memory instead of assuming their original values. These are the lines, with explanations as follows:

290 checks for up arrow
295 checks for SHIFT-down arrow
297 checks for SHIFT-up arrow
300 checks for down arrow
330 checks for ENTER

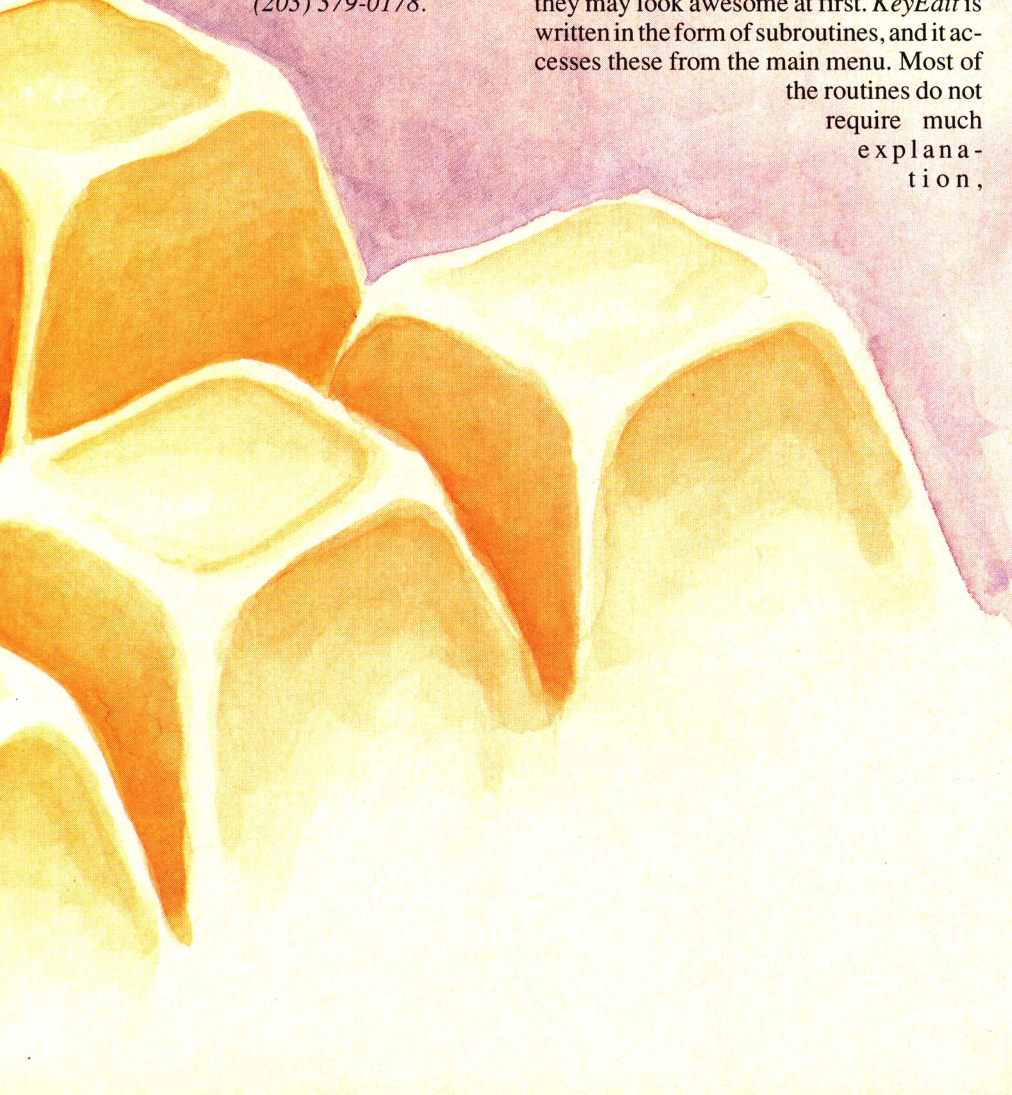
All of these codes are in the table starting at 41582 and ending at 41601.

The Print New Codes section has none of the confusing codes, but the printer configuration codes may need to be changed. They were supposed to configure the Big Blue printer for auto-linefeed, since the CoCo only sends carriage returns to the printer. Therefore, in Line 410 you can delete the `PRINT-#2` or replace my codes with your own. Line 10 sets the serial port at 1200 baud; you may need a different baud rate so check your printer or interface manual for the proper rate.

Load the listing from disk and type `RUN`. The menu of six choices is displayed as follows:

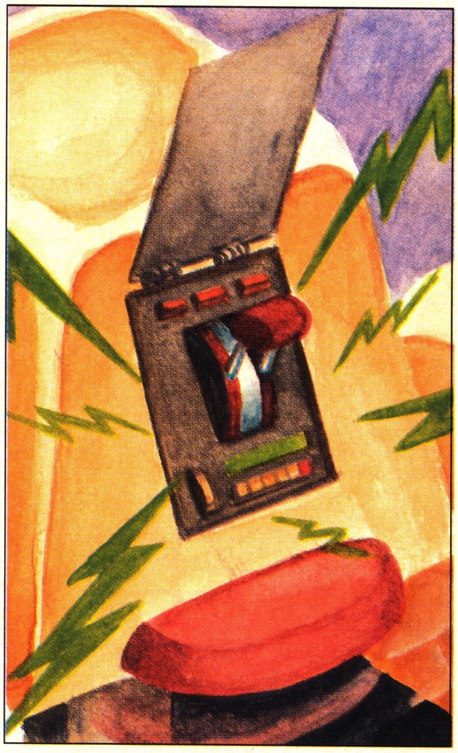
```
(1) EDIT KEYCODES
(2) PRINT NEW CODES
(3) SAVE NEW CODE TO DISK
(4) LOAD FILES
(5) PLACE DATA IN MEMORY
(6) EXIT
```

Selecting 1 places you in the editor. Use your up, down and SHIFT-up and -down keys to select one of the keycodes appearing at the top of the screeen. The shifted keys quickly bring you to the top or bottom of the list. Once you find the key you want to change, press ENTER. The name of the key and the code are shown, and you are asked to enter a new code. Pressing only ENTER sets that key at 0 and makes it completely useless unless you change it again. Your new codes do not become active until you select 5 from the main menu. Once you have made changes, press ENTER. The computer asks if you want to make more changes. Pressing N returns



you to the main menu, where you can perform another operation such as saving your work to cassette or loading other work.

LOAD and SAVE allows you to save the work in two forms: text and binary. Most of the time you want text. But when all your code is ready, save it in binary form for later use without the editor. I have tested the SAVE and LOAD binary commands under the editor, and it seems to work fine; however, you must have the ROM-to-RAM section in lines 20 through 70 already in memory to allow you to use your predefined codes. Of course, CoCo 3 users don't need this portion of the code as the CoCo 3 is always in the all-RAM mode.



Cassette Modifications

To be able to load and save the redefined codes with cassette, make the following changes:

```
210 PRINT"(3) SAVE NEW CODES TO
DISK"
490 CSAVEMF$,41582,41601,8HB4F4:
RETURN
500 OPEN"O",#-1,F$:FORC=1TO20:PR
INT#-1,A$(C),X(C):NEXTC:CLOSE#-1
:RETURN
580 CLOADMF$:RETURN
590 OPEN"I",#-1,F$
610 INPUT #-1,A$(C),X(C)
620 NEXT:CLOSE#-1:RETURN
```

Using Your New Codes

You can use your new codes from BASIC simply by using INKEY$ and checking for the new codes placed in a CHR$ function. Suppose you want to use BREAK to return to a menu and you have set it up as a value of 128. All you have to do is have the computer check to see if CHR$(128) has been entered. If so, go to your menu. It's that simple. However, do not press RESET or you will have to reload the ROM-to-RAM loader again. ❏

64K Disk

110	129
220	71
300	30
435	228
530	252
END	229

The listing: KEYEDIT

```
0 'COPYRIGHT 1989, FALSOFT INC.
10 POKE150,41'SET PORT FOR 1200
BAUD
11 'KEYEDIT V.1
12 'WRITTEN BY MIKE DALENE
13 'MARCH 14,1988
20 REM ROM TO RAM TRANSFER
30 FORX=32000 TO32025:READA:POKE
X,A:NEXTX:EXEC 32000
40 DATA 26,80,142,120,0,236,132
50 DATA 183,255,223,237,129,183
60 DATA 255,222,140,254,255,37
70 DATA 241,183,255,223,28,175,5
7
80 REM REDEFINE SOME OF THE KEYS
 AS LISTED BELOW IN DATA STATEME
NTS NEXT TO NEW VALUE
90 DATA[UP],[SH] [UP],[DN],[SH]
[DN],[LF],[SH] [LF],[RT],[SH] [R
T]
100 DATA [SPC],[SH] [SPC],0,[SH]
 0,[ENTER],[SH] [ENTER],[CLR],[S
H] [CLR],[BRK],[SH] [BRK],@,[SH]
 @
110 DIMA$(20),X(20)
120 FORC=1TO20:READA$(C):X(C)=PE
EK(41581+C):NEXTC:CLS:PRINT"I AM
 DONE ENTERING THE DATA.":FORG=1
TO25:NEXT:GOSUB 170
130 'JUMP TO PARTS OF PROGRAM
140 IFA$="6" THEN510
150 ON VAL(A$) GOSUB 270,410,435
,525,640
160 GOSUB 170:GOTO140
170 REM DISPLAY MENU
180 CLS:PRINTTAB(8);"MENU OF CHO
ICES"
190 PRINT"(1) EDIT KEYCODES"
200 PRINT"(2) PRINT NEW CODES"
210 PRINT"(3) SAVE NEW CODES TO
DISK"
220 PRINT"(4) LOAD FILES"
230 PRINT"(5) PLACE DATA IN MEMO
RY"
240 PRINT"(6) EXIT PROGRAM"
250 A$=INKEY$:IF A$<"1" OR A$>"6
" THEN 250
260 RETURN
270 CLS:PRINT"CONTROL KEYCODE ED
ITOR ENABLED"
280 A=1
285 A$=INKEY$
290 IFA$=CHR$(PEEK(41582)) THEN
A=A-1
295 IFA$=CHR$(PEEK(41585)) THENA
=20
297 IFA$=CHR$(PEEK(41583)) THENA
=1
300 IFA$=CHR$(PEEK(41584)) THENA
=A+1
310 IFA<1THENA=1
320 IFA>20 THENA=20
330 IFA$=CHR$(PEEK(41594)) THEN
350
340 PRINT@32,A;A$(A);X(A):GOTO28
5
350 PRINT"CODE IS NOW ";A$(A);X(
A):INPUT"ENTER NEW CODE";X(A):PR
INT"YOUR LINE NOW READS "A$(A);X
(A):PRINT"DO YOU WISH TO CHANGE
MORE Y/N""
360 A$=INKEY$:IFA$=""THEN 360
370 IFA$="Y" THEN270
380 IFA$="N"THENRETURN
390 GOTO360
400 'PRINT OUT CODES
410 CLS:PRINTTAB(9);"PRINTING FI
LE":PRINT#-2,CHR$(27);CHR$(53);C
HR$(1)
420 FORC=1TO20:PRINT#-2,C;TAB(3)
;A$(C);TAB(20);X(C):NEXT:RETURN
430 'FILE SAVE
435 CLS:PRINTTAB(11);"FILE SAVE"
440 INPUT"ENTER YOUR FILES NAME"
;F$:IFLEN(F$)>8 THEN PRINT"YOUR
FILENAME IS TOO BIG, IT CAN ONLY
 CONTAIN UP TO 8 LETTERS":GOTO 4
40
450 INPUT"DO YOU WANT A (B)INARY
 OR (T)EXT FILE";B$
460 IFB$="B" THEN490
470 IFB$="T" THEN 500
480 GOTO450
490 SAVEMF$+".BIN",41582,41601,&
HB4F4:RETURN
500 OPEN"O",#1,F$+".DAT":FORC=1T
O20:WRITE#1,A$(C),X(C):NEXTC:CLO
SE#1:RETURN
510 END
520 REM LOAD DATA
525 CLS:PRINTTAB(11);"FILE LOAD"
530 INPUT"FILENAME";F$:IF LEN(F$
)>8 THEN PRINT"TOO BIG! ONLY 8 C
HARACTERS OR LESS ALLOWED!":GOTO
530
540 INPUT"(B)INARY OR (T)EXT";T$
550 IFT$="B"THEN580
560 IFT$="T" THEN 590
570 GOTO 540
580 LOADMF$+".BIN":RETURN
590 OPEN"I",#1,F$+".DAT"
600 FORC=1TO20
610 INPUT#1,A$(C),X(C)
620 NEXT:CLOSE#1:RETURN
630 REM PUT DATA IN KEYBOARD MAT
RIX
640 CLS:PRINT"LOADING NEW DATA":
FORC=1TO20:POKE41581+C,X(C):PRIN
T"-";::NEXTC:PRINT"DONE!!!":FORT
T=1TO200:NEXTTT:RETURN
```

OUR LATEST 30 ISSUES

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Novices Niche

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Education

What Day?

by Rebecca Kastack

16K
ECB

Monday's child is fair of face,
Tuesday's child is full of grace,
Wednesday's child is full of woe,
Thursday's child has far to go,
Friday's child is loving and giving,
Saturday's child has to work for its living.
But the child that is born on the Sabbath day
Is fair and wise and good and gay.

Most of us know what day of the week we were born on. But if you had to say what day of the week your friend's birthday or wedding day was on, would you know? Probably not. So what do you do? Ask CoCo!

Just run *What Day?* and provide CoCo with the month and year in question. (To indicate the month, press any key until the desired month is highlighted, then press ENTER.) CoCo instantly produces a calendar for that time, showing the correct weekdays.

By trial and error *WhatDay* can also be used to find the year in which a specific date, month and day of the week would occur. The program allows for leap years and special turn-of-the-century leap years. It is accurate to 1770, when the Gregorian calendar (the current system) was adopted in most countries except for Russia and parts of Asia. *WhatDay* is also accurate for any year in the future.

The listing: `WHATDAY`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 DIM ND(12),I$(12),M$(12),M(12)
,DY$(7),PO(31)
2 '"""""""""""""""""""""""""
3 '"       WHAT DAY ?      "
4 '"   BY REBECCA KASTACK  "
5 '"""""""""""""""""""""""""
6 YE=1986:MO=12:DT=3:DY=4
7 GOTO 9
8 RESTORE
9 CLS:PRINT@11,"WHAT DAY ?":PRIN
T@40,STRING$(16,34)
10 DATA 31,january,JANUARY,128,2
8,february,FEBRUARY,192,31,march
,MARCH,256,30,april,APRIL,320,31
,may,MAY,140,30,june,JUNE,204,31
,july,JULY,268,31,august,AUGUST,
332,30,september,SEPTEMBER,150,3
1,october,OCTOBER,214
11 DATA 30,november,NOVEMBER,278
,31,december,DECEMBER,342
12 FOR A=1 TO 12:READ ND(A),I$(A
),M$(A),M(A):PRINT@M(A),M$(A);:N
EXTA:M=1:A=12
13 IF M><A THEN PRINT@M(M),I$(M)
;:PRINT@M(A),M$(A);
14 A=M
15 I$=INKEY$:IF I$="" THEN 15
16 IFASC(I$)=13 THEN 19
17 M=M+1:IFM>12 THEN M=1
18 GOTO 13
19 PRINT@384,"YEAR";:INPUTY:IFYE
>Y THEN C=Y:D=YE ELSE C=YE:D=Y
20 IFC/4<>INT(C/4)THENC=C+1:GOTO
20
21 IFD/4<>INT(D/4)THEND=D-1:GOTO
21 ELSE OO=((D-C)/4+1):IFYE>Y TH
EN C=Y:D=YE ELSE C=YE:D=Y
22 IFC/100<>INT(C/100) THEN C=C+
1:GOTO 22 ELSE IFC>D THEN25
23 FOR A=C TO D STEP 100:IFA/400
<>INT(A/400) THENOO=OO-1
24 NEXTA
25 IFY/4=INT(Y/4) THEN KK=29 ELS
E 28
26 IFY/100=INT(Y/100) THEN IFY/4
00<>INT(Y/400) THEN28
```

```
27 GOTO29
28 KK=28
29 IFYE>Y THEN35
30 'FUTURE
31 OO=OO+(Y-YE)*365+28
32 FOR Z=M TO 12:IFZ=2 THEN OO=O
O-KK ELSE OO=OO-ND(Z)
33 NEXTZ:OO=OO+1:OO=OO-INT(OO/7)
*7:YD=DY+OO:IFYD>7THENYD=YD-7
34 GOTO 41
35 'PAST
36 OO=OO+(YE-Y+1)*365-28
37 XX=M-1:IF XX<1 THEN 40
38 FOR Z=1 TO XX:IFZ=2 THENOO=OO
-KK ELSEOO=OO-ND(Z)
39 NEXTZ
40 OO=OO-1:OO=OO-INT(OO/7)*7:YD=
DY-OO:IFYD<1THENYD=7+YD
41 IFM<>2 THEN KK=ND(M)
42 CLS:B=(32-LEN(M$(M))-5)/2:PRI
NT@32+B,M$(M);Y:PRINT@98,"SUN MO
N TUE WED THU FRI SAT";:L=128:U=
(YD-1)*4+1:FORA=1 TO KK:PRINT@L+
U,A;:U=U+4:IFU>25THENU=1:L=L+32
43 NEXTA
44 PRINT@448,"PRESS ENTER TO TRY
 ANOTHER >";:INPUT Y$:RUN
```

Utility

Disk Copy Utility

by William F. Medlock

16K
ECB

Everyone likes a program that takes minutes to enter and is useful. This one is both short and useful. It copies every file from one disk to another, one file at a time — unlike `BACKUP`, which copies the whole disk, trash and all. It reads the directory and executes `COPY` commands just as you do.

One of the best uses for the program is the elimination of file fragmentation. File fragmentation happens when disk files are broken up and spread all over the disk. You can tell this is happening when the drive heads move back and forth excessively while reading or writing files. It usually happens on a disk with a variety of files that are constantly being saved and killed.

PC owners have eliminated file fragmentation by copying everything to a fresh disk using a wildcard copy. A wildcard copy is a command syntax that tells the computer to copy every file in one directory to another directory or another disk. To do the same thing on a CoCo has, until now, been laborious. Every file had to be copied one at a time, which meant typing every filename twice. Now you can throw out the trash, just like the big guys. It can be done on any model CoCo with two disk drives.

Using *Copy* is simple; I recommend using it after a hard Reset. Either turn the computer off and on again, or type in `POKE113,0`. Then push the Reset button at the right rear of the computer. Next load the program, put the source disk in Drive 0 and the destination disk in Drive 1, turn on verification if wanted, and run it.

The program loads each disk sector of the directory one at a time and extracts the filenames contained in those sectors. It inserts a period to separate the filename from the extension, then uses the filename with the `COPY` command. The program *does not* overwrite existing files on the destination disk.

The listing: `COPY`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 CLEAR 500
20 '
30 'FUNCTION RETURNS ELEMENT OF
ARRAY
40 DEFFNA(X)=INT(2*((X/8)-INT(X/
8)))
50 '
60 'FUNCTION RETURNS POSITION IN
 ARRAY
70 DEFFNB(X)=128*((X/4)-INT(X/4)
)+1
80 '
90 'TRUE IF X DIVISIBLE BY 8
100 DEFFNC(X)=(X/8-INT(X/8)=0)
110 '
120 'FUNCTION RETURNS NUMBER OF
SECTOR
130 DEFFND(X)=INT(X/8)+3
140 '
150 'PROGRAM BODY
160 ENTRY = 0
170 'LOAD DISK SECTOR INTO A$(0)
 AND A$(1)
180 IF FNC(ENTRY) THEN DSKI$0,17
,FND(ENTRY),A$(0),A$(1)
190 'PULL FILE NAME OUT OF ARRAY
200 NAME$=MID$(A$(FNA(ENTRY)),FN
B(ENTRY),11)
210 'SKIP IF ENTRY KILLED
220 IF ASC(NAME$)=0 THEN ENTRY=E
NTRY+1:GOTO 180
230 'TERMINATE IF ENTRY UNUSED
240 IF ASC(NAME$)=255 THEN END
250 'FORMAT NAME
260 NAME$=LEFT$(NAME$,8)+"."+RIG
HT$(NAME$,3)
270 'COPY FILE
280 PRINT"COPYING FILE ";NAME$
290 COPY NAME$+":0" TO NAME$+":1
"
300 'INCREMENT AND LOOP
310 ENTRY=ENTRY+1:GOTO 180
```

Graphics

Box Menu

by Bill Bernico

16K
ECB

This short subroutine spices up your menu screen and makes item selection less ordinary.

Substitute your own menu choices for these, but use the same procedure for placing the box around the chosen selection. It's all done with `PRINT@` statements. Variables `W`, `X`, `Y` and `Z` define the four areas where the character string is drawn to surround the menu choice.

Instead of `RUN` at the end of a line as in lines 7 through 10, your program actually branches off to do the task described in that selection. Scroll the menu up by starting the print on the bottom line of the screen. As more choices appear, the previous choice scrolls up until all choices are in place, ready for you to select a number and branch off.

The listing: `BOXMENU`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 'BOX MENU' (C) 1989 FROM
  BILL BERNICO SOFTWARE
  AN EXAMPLE OF HOW TO SPICE
  UP A MENU IN YOUR PROGRAMS
2 T$=CHR$(142)+STRING$(15,140)+C
HR$(141):B$=CHR$(139)+STRING$(15
,131)+CHR$(135):R$=CHR$(133):L$=
CHR$(138):CLS:PRINT@494,"menu":P
RINT:GOSUB12:PRINTTAB(8)"1. ADD
ITEMS":GOSUB12:PRINTTAB(8)"2. DE
LETE ITEMS":GOSUB12:PRINTTAB(8)"
3. SAVE TO DISK":GOSUB12
3 PRINTTAB(8)"4. LOAD FROM DISK"
:GOSUB12:PRINTTAB(8)"5. QUIT PRO
GRAM":GOSUB12:PRINTTAB(9)"SELECT
 (1-5)":GOSUB12
4 A$=INKEY$:IF A$=""THEN4
5 A=VAL(A$):ON A GOTO 7,8,9,10,1
1
6 GOTO4
7 W=74:X=138:Y=106:Z=122:GOSUB14
:GOSUB13:RUN
8 W=138:X=202:Y=170:Z=186:GOSUB1
4:GOSUB13:RUN
9 W=202:X=266:Y=234:Z=250:GOSUB1
4:GOSUB13:RUN
10 W=266:X=330:Y=298:Z=314:GOSUB
14:GOSUB13:RUN
11 W=330:X=394:Y=362:Z=378:GOSUB
14:GOSUB13:CLS:END
12 FORX=1TO100:NEXTX:EXEC43345:P
RINT@511,"":RETURN
13 PLAY"O5T60B":FORX=1TO1500:NEX
T:RETURN
14 PRINT@W,T$;:PRINT@X,B$;:PRINT
@Y,L$;:PRINT@Z,R$;:RETURN
```

Moonscape

by Jim Forster

CoCo 3

You have a view of the moon almost every night. Have you ever wanted to see the earth hanging in the sky instead? This program was written for the CoCo 3 with an RGB monitor. If you do not have an RGB monitor, some of the colors may be different.

You just might see an eclipse because each view is different. So take the place of Neil Armstrong and voyage to the moon!

The listing: `MOON`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
5 'MOONSCAPE  BY JIM FORSTER
10 ON BRK GOTO225
15 POKE65497,0
20 HSCREEN2:HCLS8
25 FOR P=1TO10:READPP:PALETTEP,P
P:NEXTP
30 DATA 3,15,17,8,63,32,56,0,50,
31
35 FORU=1TO200:D=RND(159)*2:F=RN
D(95)*2:HSET(D,F,5):NEXTU
40 D=RND(300)+10:F=RND(100)+10
45 HCOLOR9,8:HCIRCLE(D,F),9:HPAI
NT(D,F),9,9
50 HLINE(D-4,F+7)-(D-5,F+7),PSET
:HLINE(D+4,F+7)-(D+5,F+7),PSET
55 HCOLOR1,8
60 HDRAW"BM0,165"
65 FORT=1TO100
70 D=RND(2)
75 IF D=1 THEN F$="+"ELSE F$="-"
80 D$="M+"+STR$(RND(8))+","+F$+S
TR$(RND(8))
85 HDRAW D$
90 IFT>65THEN95ELSENEXTT
95 FOR E=76TO192:IFHPOINT(320,E)
<>8 THEN 105 ELSE NEXTE
100 NEXTT
105 FORZ=0TO320:HPAINT(Z,192),1,
1:NEXTZ
110 HCOLOR2,8:EX=RND(235)+30:EY=
RND(36)+30:HCIRCLE(EX,EY),30
115 HDRAW"BM"+STR$(EX-22)+","+ST
R$(EY+19)+"R5H2R3HG2D2R4UR3UR4FR
3F2R6FR2UR4E4D4R4F":HPAINT(EX,EY
+23),3,2
120 HDRAW"BM"+STR$(EX)+","+STR$(
```

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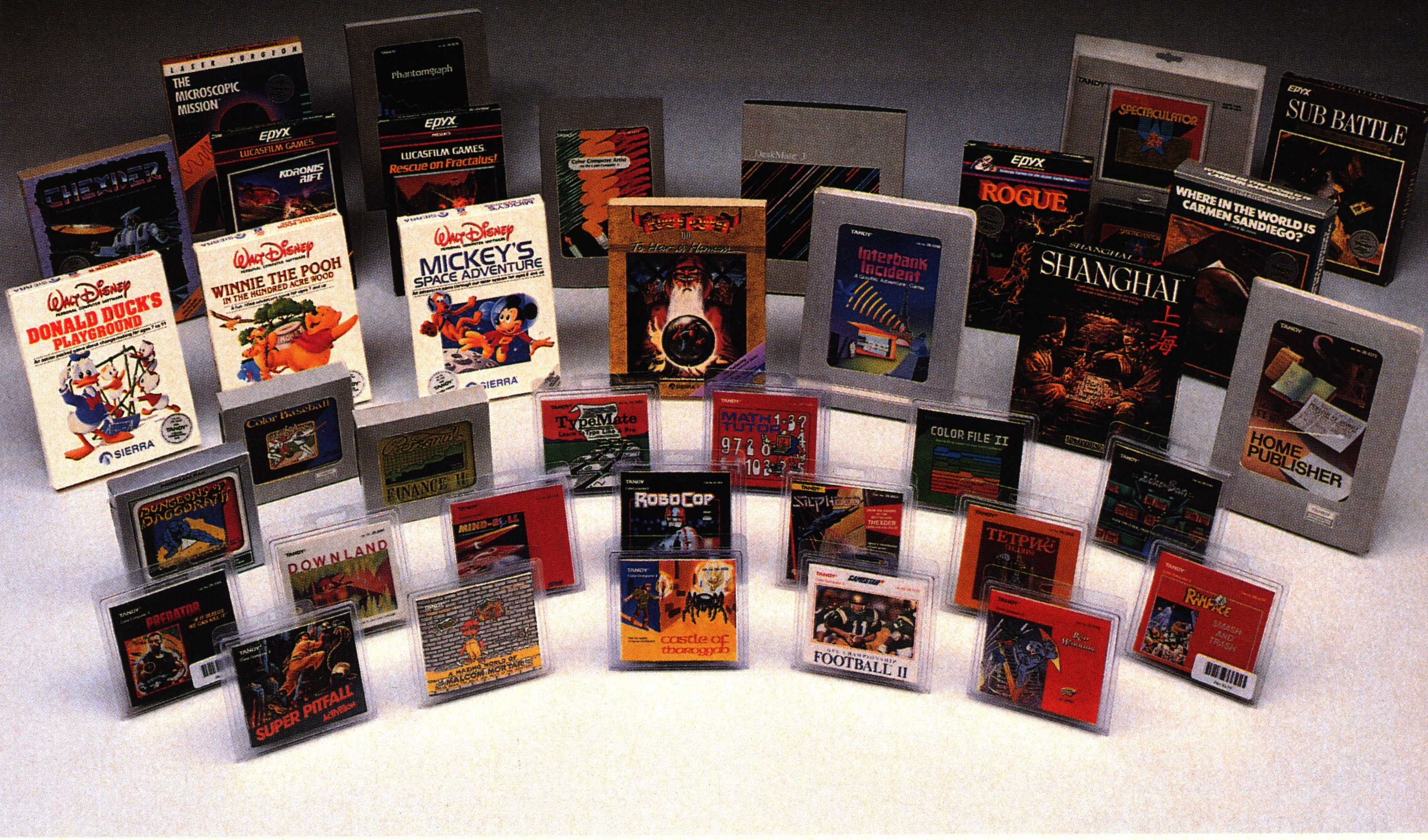
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```
EY-17)+"S3R4DR4E2R5FD3R3U2ER4F6G
8F3L2H3UL4G3L2GR3E3D2G3R3D4F2R3E
2RF3DF3DG3DG3DG3D2F2GL3U3L2U8H3L
H3U2H3L3H4U3H2LU3HU3L4G2LDH3L2U3
E3R2F2DR3F2R2":HPAINT(EX,EY-15),
3,2
125 HDRAW"BM"+STR$(EX-14)+","+ST
R$(EY-17)+"S3H2UL3HUL4U2LG2L3"
130 HDRAW"BM"+STR$(EX-14)+","+ST
R$(EY-17)+"S3G2DG2L3DG2D3R2D2G2L
2G2LD3G2L3G2L5":HPAINT(EX-17,EY-
16),3,2
135 HDRAW"BM"+STR$(EX-17)+","+ST
R$(EY+1)+"D2L2H2L3U2G2D2LG2D4R2E
2R4F3RE2U2EUH2U3":HPAINT(EX-19,E
Y+4),3,2
140 HPAINT(EX,EY),4,2
145 FORZZ=1TO130
150 HH=RND(52)+2:VV=RND(50)+5:IF
((HH<20 AND VV>15 AND VV<45) OR
(HH>38 AND VV>15 AND VV<45) OR (
VV<20 AND HH>15 AND HH<45) OR (V
V>38 AND HH>15 AND HH<45)) THEN
160
155 IF((HH<20 AND VV<20) OR (HH<
20AND VV>38) OR (HH>38 AND VV<17
) OR (HH>38 AND VV>38))THEN150
160 HSET((EX-30)+HH,(EY-30)+VV,1
0):HSET((EX-30)+HH+2,(EY-30)+VV-
1,10)
165 NEXTZZ
170 HCOLOR7,8
175 J=158:K=97
180 FORW=1TO100:K=K+1:J=158:FORO
=1TO5
185 IF HPOINT(J,K)=1THEN190ELSEJ
=J+1:NEXTO:NEXTW
190 HLINE(J,K)-(J,K-8),PSET
195 HLINE-(J+7,K-12),PSET,B
200 HCOLOR4,8
205 HSET(J+1,K-11):HSET(J+2,K-11
):HSET(J+3,K-11):HCOLOR6,8:HLINE
(J+4,K-11)-(J+7,K-11),PSET:HCOLO
R7,8:HLINE(J+1,K-10)-(J+7,K-10),
PSET:HCOLOR6,8:HLINE(J+1,K-9)-(J
+7,K-9),PSET
210 X$=INKEY$:IFX$=""THEN215ELSE
RUN
215 IF RND(125)=1 THEN PALETTE5,
55:GOSUB220:PALETTE5,63:GOSUB220
:PALETTE5,55:GOSUB220:PALETTE5,6
3:GOTO210ELSE210
220 FORT=1TO50:NEXTT:RETURN
225 POKE65496,0:HSCREEN0:WIDTH32
:END
```

The Base Converter

by James Stakelin

16K
ECB

Have you ever had the task of converting `$F1` in Base 16 to Base 2? Or have you wondered just what a hexadecimal number should mean to you? Well, worry no more. Here is *The Base Converter*, the program that takes the job off your hands.

To put it simply, *The Base Converter* translates or converts any number in any number base to any other base. If you have ever tried to do this, you know how much time a large number can consume, especially when a base higher than 10 is used. Finally you can do it electronically with your Color Computer.

To use the program, simply follow the three input prompts. Enter the number and its base, then enter the base to which you want it converted.

The listing: `CONVERT`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 CLS:PRINT"THE BASE CONVERTER"
2 PRINT:INPUT"WHAT IS THE NUMBER
 YOU NEED      CONVERTED";I$:IFI$
=""THEN2
3 INPUT"WHAT BASE IS THIS NUMBER
        IN";B:FORX=1TOLEN(I$):IF
B=<10ANDVAL(MID$(I$,X,1))=>B THE
NPRINT"IMPOSSIBLE IN GIVEN BASE.
":GOTO3ELSENEXT
4 FORX=1TOLEN(I$):FORY=65TO90:IF
ASC(MID$(I$,X,1))=Y ANDB<=10THEN
PRINT"IMPOSSIBLE IN GIVEN BASE."
:GOTO1ELSENEXT
5 INPUT"TO WHAT BASE DO YOU WANT
 THIS   CONVERTED";B1:IFB1=B THE
NPRINT"YOUR TWO BASES ARE THE SA
ME.":GOTO5ELSEIFB1<2THENPRINT"TH
E BASE IS TOO LOW.":GOTO5
7 CLS:PRINT"NUMBER:";I$:PRINT"BA
SE";B:PRINT"CONVERT TO BASE";B1:
PRINT"***********----------*****
******THE ANSWER IS:";
8 IFB>10ORB1>10THEN1000ELSEIFB<1
0THEN100
10 REM *** CONVERT TO B1 ***
11 FORX=1TOLEN(I$):N(X)=0:NEXT:G
=0:A=0:X=0
12 A=VAL(I$):IFA<B1 THENX=X+1:N(
X)=A:GOTO14
13 C=INT(A/B1):X=X+1:N(X)=A-(C*B
1):I$=STR$(C):GOTO12
14 FORY=X TO1STEP-1:A$=A$+STR$(N
(Y)):NEXTY
15 FORY=1TOLEN(A$):IFMID$(A$,Y,1
)=" "THENNEXTELSEPRINTMID$(A$,Y,
1);:NEXT
16 END
100 REM *** CONVERT TO 10 ***
101 FORX=1TOLEN(I$):N(X)=VAL(MID
$(I$,X,1)):NEXT
102 G=LEN(I$):FORX=1TO LEN(I$):G
```

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```
=G-1:A=A+N(X)*(B^G):NEXT
103 IFB1=10 THENPRINTA:END
104 I$=STR$(A):GOTO10
1000 REM *** OVER 10 CONVERT ***
1001 FORX=1TOLEN(I$):N$(X)=MID$(
I$,X,1):NEXT:FORX=1TOLEN(I$):FOR
Y=65TO90:IFN$(X)=CHR$(Y) THENN$(
X)=STR$(Y-55):NEXTY,X
1002 NEXTY,X:M=LEN(I$):FORX=1TOL
EN(I$):M=M-1:S=VAL(N$(X))*(B^M):
N$(X)=STR$(S):S=0:NEXT
1003 FORX=1TOLEN(I$):A=A+VAL(N$(
X)):NEXT
1005 IFB1=10THEN103
1006 IFB1<10THENI$=STR$(A):GOTO01
0
1010 REM *** CONVERT TO B1 ***
1011 FORX=1TOLEN(V$):N(X)=0:N$(X
)="":NEXT:V$=STR$(A):I$=V$
1012 P=VAL(I$):IFP<B1 THENJ=J+1:
N(J)=P:GOTO1014
1013 C=INT(P/B1):J=J+1:N(J)=P-(C
*B1):I$=STR$(C):GOTO1012
1014 FORY=J TO1STEP-1:IFN(Y)>9TH
ENG$=G$+CHR$(N(Y)+55):NEXTELSEG$
=G$+STR$(N(Y)):NEXT
1015 FORX=1TOLEN(G$):IFMID$(G$,X
,1)=" "THENNEXTELSEPRINTMID$(G$,
X,1);:NEXT
1016 END
```

Searching for a Rainbow

by Carlos A. Garcia

CoCo 3

Here is a simple graphics program that animates a rainbow and a waterfall. Just type in the listing and run.

The listing: RAINBOW

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 '************************
2 '*   RIVER OF RAINBOW   *
3 '*         BY           *
4 '*  CARLOS A. GARCIA    *
5 '*   ADJUNTAS ,P.R      *
6 '************************
10 ON BRK GOTO 620
20 POKE 65497,1
30 CMP
40 HSCREEN 2
50 HCLS 8
60 HCOLOR 4
70 PALETTE 15,28:PLAY"L20;O3"
80 PALETTE 14,15:PALETTE 13,3
90 PALETTE 2,29
100 FOR T=1 TO 8
110 READ A,B,C,D
120 HLINE(A,B)-(C,D),PSET
130 NEXT T
140 HPAINT(4,100),15,4
150 HLINE(0,90)-(320,90),PSET
160 HPAINT(0,0),2,4
170 HPAINT(2,125),14,4:HPAINT(32
0,95),14,4:HPAINT(0,191),13,4:HP
AINT(320,191),13,4
180 PALETTE 4,0
190 GOTO 220
200 DATA 0,96,160,110,160,110,17
0,191,170,191,130,191,130,191,12
0,120,120,120,0,110
210 DATA 0,110,0,130,0,130,120,1
20,160,110,320,100
220 PALETTE 12,64:PALETTE 11,64
230 FOR T=130 TO 160 STEP 5
240 I=I-1
250 FOR G=118+I TO 191 STEP 6
260 HSET(T,G,12)
270 NEXT G,T
280 I=0
290 FOR T=130 TO 160 STEP 5
300 I=I-1
310 FOR G=121+I TO 191 STEP 6
320 HSET(T,G,11)
330 NEXT G,T
340 H=26
350 FOR T=98 TO 107 STEP 3
360 H=H-5:S=0
370 FOR G=0 TO 130+H STEP 8
380 S=S+.7
390 HSET(G,T+S,11)
400 NEXT G,T
410 H=26
420 FOR T=98 TO 107 STEP 3
430 H=H-5:S=0
440 FOR G=4 TO 130+H STEP 8
450 S=S+.7
460 HSET(G,T+S,12)
470 NEXT G,T:S=0:C=1
480 FOR T=50 TO 70
490 S=S+1:IF S=4 THEN S=1:C=C+1
500 HCIRCLE(160,T),160,4+C,.3,.5
,1
510 NEXT T:HCOLOR9:HPRINT(1,23),
"Rainbow"
520 PALETTE 11,28:PALETTE 12,64
530 FOR G=1 TO 10:GOSUB 570:NEXT
 G
540 PALETTE 11,64:PALETTE 12,28
550 FOR G=1 TO 10:GOSUB 570:NEXT
 G
560 GOTO 520
570 C=C+1:IF C=>11 THEN C=5
580 D=D+H:IF D=>64 THEN H=RND(6)
:D=0
590 PALETTE C,D
610 RETURN
620 CLEAR:CMP:POKE 65496,1:CLS
```

Home Help

The Memo Maker

16K
ECB

by Darrin Seats

This program takes what is typed in and saves it to the disk. To load the screen back later, simply type `LOADM"FILENAME"`, and the text pops up on the screen. Every computer owner has tidbits of information written on pieces of paper. Now all you have to do is load the program and run it. It will not erase a program already in memory. Instead of scraps of paper lying around, I now have a disk that holds all my miscellaneous notes.

The listing: `MEMOMAKE`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 REM **"MEMO MAKE" CREATED BY
DARRIN SEATS
5 CLS:PRINTTAB(11)"MEMO MAKE":PR
INT:PRINT"PRESS (/) WHEN DONE WI
TH MEMO":PRINT:PRINT
10 INPUT"MEMO NAME:";N$:CLS
11 IF LEN(N$)>8THEN RUN
20 A$=INKEY$:IFA$=""THEN20
25 IFA$=CHR$(47)THEN40ELSEPRINTA
$;:GOTO 20
40 SAVEM N$,1024,1535,1024
45 PRINT:PRINT"TO SEE MEMO TYPE:
LOADM"+CHR$(34)+N$+CHR$(34)
```

Games

Gopher Smash

CoCo 3

by Thomas Wong

Have you ever tripped over a hole in your yard and discovered that gophers are inhabiting your property? If so, you probably won't be happy when the time comes to repair damages. While you're taking a break from your inevitable battle with the gophers, load *Gopher Smash* into your CoCo 3 and take out some of your frustrations.

After the program has initialized, you see nine boxes, each with a letter defining it. When a gopher pops up, press the key corresponding with the box containing the gopher, for as many times as the gopher is visible. The higher the gopher is above the ground, the more points you receive. Watch out for the surprise bombs. The bombs are the same point value as the gophers except they subtract, rather than add, from your score. The main goal is to gain

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the highest possible score in 60 seconds. When your time is up, you are asked if you want to try again or stop.

The game can be modified in several ways. For those who want customized keyboard layout, change every third value of the data statement in Line 1 with the ASCII equivalent of the keys you want to use. Also, if the gophers pop up too fast, delete the high-speed poke in Line 1. These are just a few examples of what you can do to change the program. Good luck smashing gophers!

The listing: `SMASH`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 POKE65497,0:HSCREEN2:HCOLOR0,0
:HCOLOR4,0:H=0:K=1:FORA=1TO8:HBU
FFA,750:NEXTA:FORB=1TO9:READC(B)
,D(B),E(B):NEXTB:DATA32,40,81,12
8,40,87,224,40,69,32,88,65,128,8
8,83,224,88,68,32,136,90,128,136
,88,224,136,67
2 HCIRCLE(28,24),28,4,.3,.5,0:HC
IRCLE(14,24),8,4:HCIRCLE(14,24),
2,4:HCIRCLE(42,24),8,4:HCIRCLE(4
2,24),2,4:HDRAW"BM28,24F8L16E8BD
10R8D2G4L8H4U2R8D6":HPAINT(14,20
),7,4:HPAINT(42,20),7,4:HLINE(0,
24)-(0,40),PSET:HLINE-(56,40),PS
ET:HLINE-(56,24),PSET
3 HPAINT(28,28),2,4:HLINE(88,16)
-(88,20),PSET:HLINE(60,20)-(116,
40),PSET,B:HLINE(60,27)-(116,33)
,PSET,B:HPAINT(88,23),2,4:HPAINT
(88,30),3,4:HPAINT(88,36),5,4:HD
RAW"BM120,18D20R16U8R36U4L36U8L1
6":HPAINT(130,28),6,4:HLINE(120,
22)-(136,34),PSET,B
4 HGET(0,0)-(56,24),1:HGET(0,8)-
(56,32),2:HGET(0,16)-(56,40),3:H
GET(180,16)-(236,40),4:HGET(60,0
)-(116,24),5:HGET(60,8)-(116,32)
,6:HGET(60,16)-(116,40),7:HGET(1
20,16)-(176,40),8:HCLS:HCOLOR2:H
LINE(4,4)-(316,28),PSET,BF:HLINE
(4,32)-(316,182),PSET,B
5 HCOLOR3:FORF=16TO208STEP96:FOR
G=65TO161STEP48:HLINE(F,G)-(F+88
,G+16),PSET,BF:NEXTG,F:HCOLOR4:H
PRINT(7,9),"Q":HPRINT(19,9),"W":
HPRINT(31,9),"E":HPRINT(7,15),"A
":HPRINT(19,15),"S":HPRINT(31,15
),"D":HPRINT(7,21),"Z":HPRINT(19
,21),"X":HPRINT(31,21),"C
6 I=0:J=61:HPUT(C(K),D(K))-(C(K)
+56,D(K)+24),4
7 J=J-1:HPRINT(1,1),"SCORE:":HPR
INT(19,1),"HI-SCORE:":HPRINT(16,
2),"TIME:":HCOLOR2:HLINE(56,8)-(
136,15),PSET,BF:HLINE(232,8)-(30
4,15),PSET,BF:HLINE(168,16)-(190
,23),PSET,BF:HCOLOR4:HPRINT(7,1)
,I:HPRINT(28,1),H:HPRINT(21,2),J
8 IF I>H THENH=I:J=J+1:GOTO7
9 IF J<1 THEN HPRINT(15,5),"GAME
 OVER":HPRINT(4,23),"Do you want
 to play again (Y/N)?":R$=INKEY$
:IFR$="Y"THENHCOLOR0:HLINE(120,3
8)-(192,47),PSET,BF:HLINE(32,184
)-(288,192),PSET,BF:HCOLOR4:GOTO
6ELSEIFR$="N"THENPOKE&HFFD8,0:WI
DTH32:ENDELSE9
10 K=RND(9):L=RND(2):IF L=1THENM
=0ELSEM=4
11 N=M+1:O=N:P=1
12 HPUT(C(K),D(K))-(C(K)+56,D(K)
+24),O:Q$=INKEY$:IF Q$<>"" THEN
GOSUB17
13 O=O+P
14 IF O>N+2 THEN O=N+2:P=-1
15 IF O<N THEN HPUT(C(K),D(K))-(
C(K)+56,D(K)+24),4:GOTO7
16 GOTO12
17 FORS=1TO9
18 IF ASC(Q$)=E(S)THEN19ELSE20
19 HPUT(C(S),D(S))-(C(S)+56,D(S)
+24),8:HPUT(C(S),D(S))-(C(S)+56,
D(S)+24),4:SOUNDE(S),1:IF S=K TH
EN GOSUB21
20 NEXTS:RETURN
21 IFL=1THENI=I+O:HPRINT(1,2),"O
UCH!":GOSUB24:HLINE(8,16)-(48,24
),PSET,BF
22 IFL=2THENI=I-(O-4):HPRINT(34,
2),"BOOM!":GOSUB24:HLINE(272,16)
-(312,24),PSET,BF
23 HCOLOR4:RETURN
24 HCOLOR2:FORT=1TO50:NEXTT:RETU
RN
```

Quickgrass

by Joshep Pendell

16K
ECB

Quickgrass is a game where you must move your lawn mower over grass blades that are really growing fast. The object of the game is to prevent the grass from reaching the top line for as long as possible. The grass will grow faster and faster, the longer you play. When a blade of grass finally reaches the top, a score is given based on how long you survived.

The lawn mower is controlled with the right joystick. The game operates more smoothly if the high-speed poke is used, and the variable `SC` holds the score. `OLD` is the last *x* position of the lawn mower stored for erasure later. `J` is how much higher the grass will rise when it grows. `D` is the rate at which `J` increases to make the game harder. Array `A` holds the image of the lawn mower, while Array `B` holds a block of the background color to erase the lawn mower when moved. A simple modification would be to set `D` (initialized in Line 130) to a higher number than 10 to make the game a little easier.

The listing: `QGRASS`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 REM QUICKGRASS
2 REM BY JOSEPH PENDELL
10 DIM A(20)
20 DIM B(20)
30 DIM H(115)
40 PMODE 1,1:PCLS
50 DRAW"C2BM0,192;U1;R1;U1;R1;E1
;U1;R2;D1;F1;R1;D1;R1;D1;"
60 GET(0,100)-(8,192),A
70 PCLS:SCREEN1,0
80 GET(0,100)-(8,192),B
90 COLOR3,1
100 LINE(0,99)-(255,99),PSET
110 COLOR 4,1
120 FORI=1TO115:H(I)=0:NEXTI
130 SC=0:D=10:J=25:OLD=0
140 X=JOYSTK(0)*220/63+10
150 PUT(OLD,100)-(OLD+8,192),B:P
UT(X,100)-(X+8,192),A:FORI=(X/2)
-4 TO (X/2):H(I)=0:NEXTI:OLD=X
160 Q=RND(115):H(Q)=H(Q)+RND(J)
170 LINE((Q+4)*2,192)-((Q+4)*2,1
92-H(Q)),PSET
180 SC=SC+1
190 IFRND(D)=1 THENJ=J+5
200 IF H(Q)<92 THEN 140
210 'GAME OVER
220 CLS:PRINT"QUICK GRASS SCORE=
";SC
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one screen sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

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Disk Track Tracer

by Tony DiStefano
Contributing Editor

The other day I was visiting a friend who showed me a new toy for his Atari ST computer. There was a device hooked up to his disk drive — a small box with two LED displays. When I first saw it, the displays read 00. "So what!" I exclaimed. "What does it do?"

He demonstrated it by accessing the drive. It whirred a little, then the LED display started to change. In fact, every time the disk drive stepped, the display changed. Upon further investigation of the new gadget, I learned that it was a track tracer. The LEDs always display the track number on which the disk drive's head is sitting. What a novel idea! Of course I had to have one for my computer as well. So after my visit I went home with one thing on my mind — the track tracer. He had spent a good sum of money for it and waited weeks for it to arrive from England. I didn't want to pay that much, nor did I want to wait that long. But I really wanted it, and once I get an idea in my head, there isn't much I can't do. I sat and thought, grabbed a sheet of paper and a pencil, and came up with something.

I looked in my trusty TTL manual (*The TTL Data Book Volume* 2), and a project began to grow into two sections — the counter and the display driver. Since I wanted a project with as few parts as possible, because fewer parts mean less wiring and less cost, the first thing I came across was a typical display chip, the 74LS48 or 7448. It is a BCD (Binary Coded Decimal) to seven-segment display decoder driver with built-in resistors.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

Look at Figure 1. There are two 74LS48s that serve to drive two seven-segment displays. This type of chip requires a display that has a common cathode. In Figure 1 I left out the pin numbers for the display because there is no standard for display pin-outs. When you use them, make sure that the pin-out comes with it. The important thing is that the segments are labeled with letters A through G. Then the only other pin you need will be ground, which is what the diagram shows.

If the display is too dim, you may want to add a few 1K resistors. You need seven resistors for each display. Tie one side of each resistor to +5 volts and the other side to each of the outputs, labeled A through G.

There are four inputs to the 74LS48 for the digits. Remember, you want to display the numerical digits 0 through 9 for each display, and three bits give you only eight combinations. A fourth bit is needed, which gives you 16 combinations — a few too many, I know. Just make sure you don't output a number greater than nine.

For your own interest, try inputting a higher number. The display shows garbage. There are other display chips that display numbers 10 through 15 as letters A through F, which could be good for projects requiring displays in hexidecimal. For now, you need only decimal. The other inputs of the 74LS48 are not used in this case. Refer to your TTL manual for a description of these pins.

That takes care of the display side of things — now let's look at the other side. To choose the chip, I took a look at what signals were available. The tracks are accessed by a stepper motor, which needs two signals — a step signal and a direction. In digital terms you need a chip that is able to count up and down — an up/down counter. After studying the TTL index, I came up with the 74LS190, which is a synchronous up/down counter. It's just what you need, and it's all in one chip. Remember, there is always more than one way to do any given thing in TTL. I used the easiest way.

Let's go through this chip one pin at a time. There are four outputs, otherwise known as the count number, that feed the display driver. Look at Figure 1, U1. Pin 14 is the CLK, or clock input. Every time a pulse appears on this pin, the counter counts by one. The direction it counts depends on the D/U (down/up) pin, which is connected to the direction pin on the disk drive — one pulse, one count. When the count goes up to and passes 9, the RCO (Ripple Count Overflow) clocks the next digit. In the other direction, when 0 goes down to 9, the RCO substracts from the next digit.

Next is Pin 4, an enable pin (G for Go). This pin is connected to the drive enable pin of the drive and is necessary because the circuit can keep track of only one drive. If your system has more than one drive, the counter is only activated when the appropriate drive is accessed. You must connect this pin to whatever drive you want to keep track of. The pin numbers for each of the four drives accessible on the CoCo are as follows:

Drive	Pin Number
0	10
1	12
2	14
3	32

Connect the DR0 pin to whatever drive you want to keep track of.

We now have an up/down counter with direction. The next problem is that the circuit must have a point of reference. When you first turn on the computer and drive, the circuit does not know what track the drive is sitting on — it could be on any track. The only reference point is another available

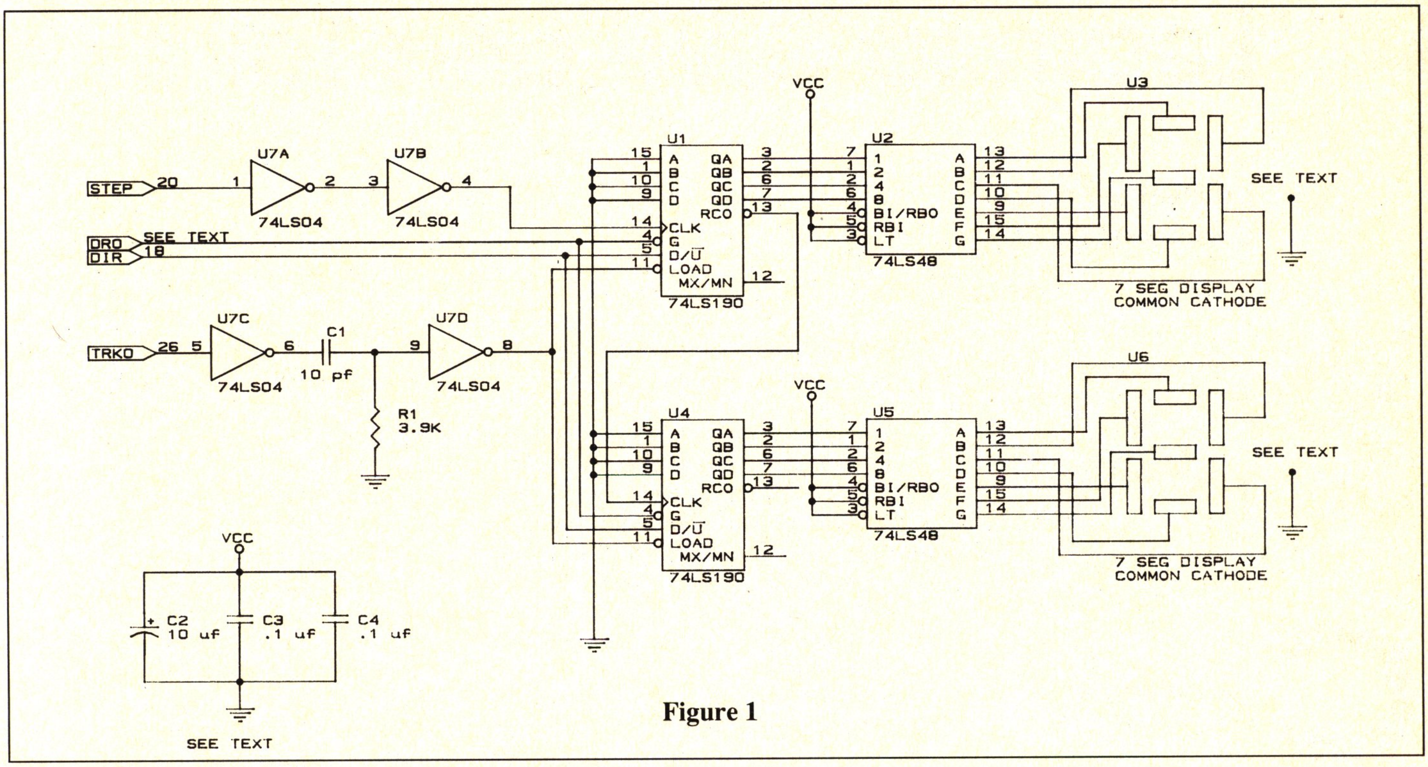

Figure 1

pin on the drive, the Track 0 detector. I used this pin to load the counters with a preset number, which in this case is 0. Examine Figure 1 again and look at the four inputs, A through D. They are used to load a number into the counter. In our case we need a zero, so all four inputs are soldered to ground. Pin 11 is used to load the value of A through D into the outputs of the counter. The TRK0 signal is active as long as the drive heads sit on Track 0. As soon as the stepper motor hits Track 0, a logical low is seen on TRK0. This causes a pulse to be carried through C1. A short pulse is all that is needed to load the 74LS190 with 0. It is important to note that this counter does not properly display the track number until the first access to Track 0. You can easily force this by doing a `DIR` with the drive door open. Disk BASIC tries to read the disk, gets an error and seeks to Track 0. Then bingo, our circuit is now also calibrated.

In theory, the track tracer works well. But when I tried it, noise on the drive line made the counter unreliable. The two inverters to the step input are used to clean up that signal.

Construction Notes

There are many ways to put this project together. I'll give you some hints and leave it up to you to decide what is best for you. The simplest way is to build it inside your drive case if you have room. The circuit is built on a small proto-board; mount all components using sockets because it's safer. Not shown in Figure 1 are the +5 volts and ground for the ICs — U1, U2, U4 and U5. The +5-volts pin is 16; Ground is Pin 8. For U7, +5-volts is on Pin 14 and ground is on Pin 7. Capacitors C3 and C4 should be phyically close to U1 and U4. You can position C2 just about anywhere, using the +5 volts available from the power supply of the drive.

If you want to get fancy, mount the circuit inside a small utility box, build a +5-volt power supply and connect it to your drive cable using another 34-pin connector. A four-position switch can also be used to select the drive you want to keep track of, or you can even double this circuit and watch two sets of digits. Since all the signals needed are inside your disk controller, you can mount the circuit inside your controller, cut a hole in the cover, and mount the display on the outside. You can use big or small displays, depending on where you want to mount them. I won't detail how and where to mount this; if you understand the circuit and can build it, you know enough on how to mount it. Here is what you need for this project:

Part	**Description**
U1,U4	74LS190
U2,U5	74LS48 or 7448
U3,U6	7-segment display, common cathode
U7	74LS04
C1	10 pF capacitor
C2	10 uF capacitor
C3,C4	.1 uF capacitor
R1	3.9K resistor

Misc. Parts: Proto-board, 14 - 1K resistors, power supply, utility case and 34-pin connector.

After it is built, tested and running well, what do you use it for? The original track tracer my friend has is advertised as a tool for tracing what track software has accessed. The reason I built it is because I thought it was a neat conversation piece. I like things that flash and blink. When people come over and look at my set-up . . . well, you know!

Learn to Give and Take

by Fred B. Scerbo
Contributing Editor

> *If you have an idea for the "Wishing Well," submit it to Fred c/o* THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Coming very soon is the tenth anniversary of the introduction of the Color Computer by Tandy. Some CoCo loyalists may even remember when it was called the TRS-80 Color Computer. Over the years it has been known by different names. Still the one I most like to call it is *practical.*

When it comes to using a BASIC language that is easy to manipulate, nothing beats the CoCo's Extended Color BASIC. The ease of using this language made this month's program a breeze to write. The program is called *Primary Math Driller*, and it is the newest version of a program called *Multi Math Driller*, which appeared previously in this column.

Several years ago I wrote a program called *Multi Math Driller* to help students drill math tables in multiplication. *Driller* was so popular that I created a new version with division drills called *Driller 2*. Recently, however, many readers have suggested educational programs for younger CoCo users, particularly primary school students. Multiplication and division drills are of little use to a child who has not yet mastered addition or subtraction.

Now there is *Driller 3*, a program that drills the child in both addition and subtraction. I have also added some new features to the subroutines that create this program. The first two versions give only a raw score (i.e., five wrong out of 25 tries). The new version includes the standard score card, a feature that appears in many of my educational programs.

The score card may be activated by pressing the @ key. I must warn you, however, that it may not respond the first few times you press it. (Jiggle it a few times.) The reason for this has to do with how `INKEY$` works. Usually you can use a line such as `X$=INKEY$:IF X$=`. (If you use this method, the keyboard may get a few steps ahead of you.) Therefore, pressing the space bar too many times might give you a false response as the keyboard gets ahead of itself. Instead I used `IF INKEY$=` to check the keyboard so no false responses are recorded. At the same time, however, you must do a little jiggling to make it recognize the @ key. It is a small trade-off to ensure no unnecessary responses are recorded. Believe me, there is nothing more frustrating for some children than to have the computer misread a response.

Using the Program

The program is easy to run, and you can also tailor it to meet your needs without too much trouble.

There is a slightly different title card than usual on this program. Throughout the entire program *Driller 3* uses the letter set that the *CoCo TitleMaker* program uses. Pressing any key sets up your choices. Press A for Addition or S for Subtraction. The next choice asks you to pick the speed of the program. The fastest is 1 while 9 is the slowest. I suggest that anyone trying the program for the first time start with 9. The next question asks you to pick the desired tables from one to nine. The number you select is added to or subtracted from a random number from 1 to 9.

Next the screen asks if you want the tables assorted. Answering Yes mixes in all tables lower than the number you have selected for the tables. Selecting No gives you only the table number you selected. Using the Assorted option is really best, especially when using subtraction. In subtraction, if you select nine (9) and No for assorted, you only get the same problem over and over again (9-9=0). This is because only one number (9) is either equal to or greater than the selection you chose. For example, selecting eight (8) with no assortment only allows two problems (9-8=? and 8-8=?). Therefore, use the assortment when using subtraction.

Drilling

The rest of the program is very much like *Driller 1* and *2* — the screen displays a colorful oil rig; the top of the screen displays a problem in large numbers and letters; and at the bottom of the screen a field of answers runs by. When you see the correct answer come under the rig, press the space bar or the fire button on the right joystick. You may want to press it just before the answer comes under the rig. If some of the answer goes by, the program records a miss instead of a hit.

If the answer is correct, the screen shows a colorful display and the entire problem at the top of the screen. If you score a miss, the screen says `WRONG` and `TRY AGAIN`. If the user gets 20 consecutive correct answers without an error, the oil well erupts in a geyser. It is a very nice display when you hit pay dirt!

As I mentioned earlier, jiggling the @

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

key during a problem advances you to the scorecard.

Custom Changes

Notice I have included the old MC-10 routines for those of you who still use the machine. Some of you may find that 20 problems are too few. If that is the case, you can change Line 25, which reads `25 BR=30:YS=20`. The variable `BR` is the maximum number of tries; `YS` is the number of problems. You may increase these values to any number and save the program. For example, `25 BR=60:YS=50` allows up to 60 tries of 50 different problems. I thought it was much easier to have the value set in the program rather than add another option at the beginning of the program. Too many options tend to scare the user.

Driller 3 or *Primary Math Driller* is colorful, interesting and can have an impact on your child's learning process. Let me know what other types of programs you would like to see in coming months. ❑

75	206
130	157
200	83
280	123
385	100
445	28
500	221
545	148
650	8
725	22
795	103
860	39
915	148
END	133

The listing: `DRILLER3`

```
1 REM***************************
2 REM*  PRIMARY MATH DRILLER  *
3 REM*   BY FRED B. SCERBO    *
4 REM*   60 HARDING AVENUE    *
5 REM*  NORTH ADAMS, MA 01247 *
6 REM*   COPYRIGHT (C) 1989   *
7 REM***************************
10 CLS0
15 CLEAR500
20 FOR ZZ=1TO96:BB$=BB$+CHR$(128
):NEXTZZ
25 BR=30:YS=20
30 REM IF MC-10 THEN MC=15360
35 MC=0
40 DIM A(45,9),B(4,12)
45 FORI=2TO11:FORY=1TO9:READ A(I
,Y):NEXTY,I
50 FORI=19TO44:FORY=1TO9
55 READ A(I,Y)
60 NEXTY,I
65 FORI=1TO4:FORY=1TO12:READ B(I
,Y):NEXTY,I
70 FOR ZZ=0TO31:PRINT@ZZ,CHR$(18
8);:NEXT ZZ:FOR ZZ=320TO351:PRIN
T@ZZ,CHR$(179);:NEXT ZZ:FORI=0TO
21:SET(0,I,4):SET(63,I,4):NEXT
75 W$="PRIMARY":C=64:L=34:GOSUB5
90:W$="MATH":C=32:L=136:GOSUB590
:W$="DRILLER":C=16:L=227:GOSUB59
0
80 REM <SHIFT><0> FOR LOWERCASE
85 R$=CHR$(128):PRINT@417,"by"+R
$+"fred"+R$+"scerbo"+R$+R$+"copy
right";
90 POKE1467+MC,49:POKE1468+MC,57
```

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```
:POKE1469+MC,56:POKE1470+MC,57
95 GOSUB730:FORI=417TO480:PRINT@
I,CHR$(128);:NEXTI
100 PRINT@452,"a"+R$+"ddition"+R
$+"or"+R$+R$+"s"+R$+"ubtraction"
;
105 POKE1475+MC,40:POKE1477+MC,4
1:POKE1485+MC,32:POKE1488+MC,32:
POKE1489+MC,40:POKE1491+MC,41
110 X$=INKEY$:IFX$=""THEN110
115 IFX$="A"THEN SC=1:GOTO130
120 IFX$="S"THEN SC=0:GOTO130
125 GOTO110
130 FORI=451TO478:PRINT@I,R$;:NE
XT:PRINT@353,"select"R$"speed"R$
"from"R$"fast"R$"to"R$"slow";:GO
SUB140
135 GOTO145
140 W$="1 TO 9":C=112:L=422:GOSU
B590:RETURN
145 X$=INKEY$:IFX$=""THEN145
150 X=ASC(X$):IFX<49THEN145
155 IFX>57THEN145
160 K=VAL(X$):DL=K*8
165 CLS0:W$="SELECT":C=32:L=4:GO
SUB590:W$="DESIRED":C=48:L=98:GO
SUB590
170 W$="TABLES":C=16:L=196:GOSUB
590:W$="FROM":C=64:L=296:GOSUB59
0:GOSUB140
175 X$=INKEY$:IFX$=""THEN175
180 X=ASC(X$):IFX<49THEN175
185 IFX>57THEN175
190 K=VAL(X$)
195 CLS0:W$="DO YOU":C=80:L=5:GO
SUB590:W$="WANT THE":C=112:L=96:
GOSUB590:W$="TABLES":L=196:C=64:
GOSUB590
200 W$="ASSORTED":C=32:L=288:GOS
UB590:W$="Y ":C=16:L=386:GOSUB59
0:W$="OR ":C=0:GOSUB590:W$="N ":
C=16:GOSUB590
205 PRINT@L+1,CHR$(190);CHR$(188
)CHR$(191);:PRINT@L+33,CHR$(128)
CHR$(188)CHR$(188);:SET(54,28,4)
210 X$=INKEY$:IFX$="Y"THEN225
215 IFX$="N"THEN230
220 GOTO210
225 AJ=1:GOTO230
230 CLS0:GOSUB240
235 GOTO245
240 W$="WHAT IS":C=16:L=3:GOSUB5
90:RETURN
245 FOR ZZ=416TO447:PRINT@ZZ,CHR
$(188);:NEXT ZZ:FOR ZZ=480TO510:
PRINT@ZZ,CHR$(179);:NEXT ZZ
250 POKE1535+MC,179
255 E=29:F=34:FORG=10TO24STEP2
260 FORI=E TO F:SET(I,G,5):NEXTI
265 SET(E-1,G+1,6):SET(F+1,G+1,6
)
270 E=E-1:F=F+1:NEXTG
275 FORI=12TO26:SET(31,I,3):SET(
32,I,3):NEXTI
280 IF SC=0 THEN290
285 PRINT@110,"plus";:GOTO295
290 PRINT@109,"minus";
295 FOR TP=1TO YS:NP=0:IF TR=>BR
 THEN540
300 IF AJ=0 THEN E=K
305 IF AJ=1 THEN E=RND(K)
310 F=RND(9)
315 IF SC=1THEN325
320 IF E>F THEN 310
325 LN=F:I=E+2:L=151:C=112:GOSUB
680:I=F+2:L=135:GOSUB680
330 IF SC=0THEN 340
335 AN=E+F:GOTO345
340 AN=F-E
345 F$=STR$(AN):FORI=1TO6:G=RND(
18):H$=STR$(G):F$=F$+"    "+H$:N
EXTI
350 J$=LEFT$(F$,32)
355 PRINT@448,J$;
360 L$=RIGHT$(J$,31):M$=LEFT$(J$
,1):J$=L$+M$
365 FORP=1TO DL:NEXTP:IFTR=>BR T
HEN540
370 IFINKEY$=CHR$(32)THEN410
375 IFINKEY$="@"THEN945
380 REM IF MC-10 DELETE LINE700
385 IFPEEK(339)=254THEN410
390 NP=NP+1:IFNP=150THEN400
395 GOTO355
400 PRINT@0,BB$;:W$="THINK":C=64
:L=6:GOSUB590:SOUND1,2:SOUND1,2:
SOUND1,2
405 GOTO355
410 TR=TR+1:PRINT@431,CHR$(186)C
HR$(181);:PRINT@463,CHR$(138)CHR
$(133);
415 IF AN=VAL(MID$(J$,15,4))THEN
425
420 GOTO475
425 PRINT@0,BB$;
430 FORC=16TO112STEP32:W$="CORRE
CT":L=3:GOSUB590:SOUNDC+1,1:NEXT
C
435 PRINT@0,BB$;:I=F+2:L=0:C=48:
GOSUB680:PRINT@5,CHR$(128)CHR$(1
28);
440 IF SC=0THEN450
445 PRINT@5,CHR$(165)CHR$(170);:
PRINT@36,CHR$(172)CHR$(173)CHR$(
174)CHR$(172);:PRINT@69,CHR$(164
)CHR$(168);:GOTO455
450 PRINT@36,CHR$(172)CHR$(172)C
HR$(172)CHR$(172);
455 W$="   ":GOSUB590:I=E+2:C=48
:GOSUB680
460 PRINT@16,CHR$(147)CHR$(147)C
HR$(147);:PRINT@48,CHR$(147)CHR$
(147)CHR$(147);:W$="   ":C=16:GO
SUB590:W$=STR$(AN):C=32:GOSUB590
465 GOSUB730:PRINT@0,BB$;:GOSUB2
40:CR=CR+1:NEXT TP
470 GOTO495
475 PRINT@0,BB$;:W$="WRONG":C=64
:L=6:GOSUB590:SOUND20,1:SOUND2,1
:SOUND20,1:SOUND2,1
480 WR=WR+1:PRINT@0,BB$;:W$="TRY
":C=32:L=10:GOSUB590:FORI=1TO300
:NEXT:PRINT@0,BB$;:W$="AGAIN"
485 C=96:L=6:GOSUB590:FORI=1TO30
0:NEXT:PRINT@0,BB$;:GOSUB240:IF
NP>100THEN NP=0
490 GOTO355
495 IFTR<>YS THEN540
500 PRINT@0,BB$;:FOR JJ=448TO479
:PRINT@JJ,CHR$(159);:NEXTJJ
505 FORI=28TO10STEP-1:SET(31,I,2
):SET(32,I,2):SOUND230,1:NEXTI:F
ORI=1TO7:SET(30-I*2,10-I,2)
510 SET(33+I*2,10-I,2):SOUND230,
1:NEXTI:SET(30-I*2,11-I,2):SET(3
3+I*2,11-I,2)
515 FORI=1TO12:SET(13-I,2+I*2,2)
:SET(50+I,2+I*2,2):SOUND230,1:NE
XTI:FORI=1TO20:SOUNDRND(230),1:N
EXT
520 CLS0:W$="YOU  HIT":C=32:L=2:
GOSUB590:W$="PAYDIRT":C=64:L=98:
GOSUB590
525 W$="WITH A":C=48:L=196:GOSUB
590:W$="PERFECT":C=16:L=290:GOSU
B590
530 W$="SCORE":C=112:L=390:GOSUB
590
535 GOSUB730
540 CLS0:W$="OUT OF":C=16:L=6:GO
SUB590:W$=STR$(TR)+" TRIES":C=48
:L=96:GOSUB590:W$="YOU HAD"
545 C=32:L=196:GOSUB590:W$=STR$(
WR):C=64:L=307-(LEN(W$)*3):GOSUB
590
550 W$="MISSES":IF WR=1 THEN W$=
"  MISS"
555 C=112:L=388:GOSUB590
560 IFINKEY$=CHR$(13)THEN570
565 GOTO560
570 PRINT@483,"press"R$"enter"R$
"for"R$"your"R$"score";
575 FORI=1TO1000:NEXT
580 IFINKEY$=CHR$(13)THEN945
585 GOTO580
590 P=LEN(W$):FORZ=1TOP:I=ASC(MI
D$(W$,Z,1))-46
595 IFI=31THEN630
600 IFI=32THEN640
605 IFI=41THEN650
610 IFI=42THEN660
615 IFI=-14THEN670
620 GOSUB680
625 GOTO675
630 I=1:GOSUB705
635 GOTO675
640 I=2:GOSUB705
645 GOTO675
650 I=3:GOSUB705
655 GOTO675
660 I=4:GOSUB705
665 GOTO675
670 L=L+2
675 NEXT:RETURN
680 PRINT@0+L,CHR$(A(I,1)+C)CHR$
(A(I,2)+C)CHR$(A(I,3)+C);
685 PRINT@32+L,CHR$(A(I,4)+C)CHR
$(A(I,5)+C)CHR$(A(I,6)+C);
690 PRINT@64+L,CHR$(A(I,7)+C)CHR
$(A(I,8)+C)CHR$(A(I,9)+C);
695 L=L+4:RETURN
700 GOTO700
705 PRINT@0+L,CHR$(B(I,1)+C)CHR$
(B(I,2)+C)CHR$(B(I,3)+C)CHR$(B(I
,4)+C);
710 PRINT@32+L,CHR$(B(I,5)+C)CHR
$(B(I,6)+C)CHR$(B(I,7)+C)CHR$(B(
I,8)+C);
715 PRINT@64+L,CHR$(B(I,9)+C)CHR
$(B(I,10)+C)CHR$(B(I,11)+C)CHR$(
B(I,12)+C);:L=L+5:RETURN
720 PRINT@Q,CHR$(154);:PRINT@Q+3
0,CHR$(145)CHR$(128)CHR$(154)CHR
$(145);
725 PRINT@Q+63,CHR$(153)CHR$(155
)CHR$(152);:PRINT@Q+96,CHR$(152)
```

```
;:RETURN
730 FORI=1TO1500:TU=RND(9999)
735 REM MC-10 DELETE LINE1380
740 IFPEEK(339)=254THEN750
745 IFINKEY$=""THENNEXT
750 RETURN
755 DATA 135,140,139,143,128,143
,132,140,136
760 DATA 129,143,128,128,143,128
,132,140,136
765 DATA 142,140,139,131,140,129
,140,140,140
770 DATA 140,140,139,140,140,143
,140,140,136
775 DATA 143,133,138,140,141,142
,128,132,136
780 DATA 143,140,140,140,140,143
,140,140,140
785 DATA 143,140,140,143,140,143
,140,140,140
790 DATA 142,140,143,128,135,136
,132,136,128
795 DATA 143,140,143,143,140,143
,140,140,140
800 DATA 143,140,143,140,140,143
,140,140,140
805 DATA 135,140,139,143,140,143
,140,128,140
810 DATA 143,140,139,143,140,139
,140,140,136
815 DATA 143,140,140,143,128,128
,140,140,140
820 DATA 143,140,139,143,128,143
,140,140,136
825 DATA 143,140,140,143,140,140
,140,140,140
830 DATA 143,140,140,143,140,140
,140,128,128
835 DATA 143,140,140,143,132,143
,140,140,140
840 DATA 143,128,143,143,140,143
,140,128,140
845 DATA 132,143,136,128,143,128
,132,140,136
850 DATA 140,141,142,128,133,138
,140,140,136
855 DATA 143,129,142,143,141,130
,140,128,140
860 DATA 143,128,128,143,128,128
,140,140,140
865 DATA,,,,,,,,,,,,,,,,,
870 DATA 143,140,143,143,128,143
,140,140,140
875 DATA 143,140,143,143,140,140
,140,128,128
880 DATA 143,140,143,143,129,143
,140,140,142
885 DATA 143,140,143,143,141,130
,140,128,140
890 DATA 143,140,140,140,140,143
,140,140,140
895 DATA 140,143,140,128,143,128
,128,140,128
900 DATA 143,128,143,143,128,143
,140,140,140
905 DATA 139,128,135,141,131,142
,128,140,128
910 DATA,,,,,,,,,,,,,,,,,
915 DATA 139,128,135,132,143,136
,128,140,128
920 DATA 140,140,143,131,140,128
,140,140,140
925 DATA 143,130,129,143,143,132
,136,143,140,128,128,140
930 DATA 143,139,128,143,143,132
,139,143,140,128,132,140
935 DATA 143,128,128,143,143,134
,137,143,132,136,132,136
940 DATA 141,130,129,142,129,134
,137,130,140,128,128,140
945 CLS:PRINT@101,"YOU USED"TR"T
RIES AND":PRINT@165,"ANSWERED"CR
"CORRECTLY"
950 PRINT@229,"WHILE DOING"WR"WR
ONG.":NQ=CR+WR:IFNQ=0THENNQ=1
955 MS=INT(CR/NQ*100):PRINT@293,
"YOUR SCORE IS"MS"%."
960 PRINT@357,"ANOTHER TRY (Y/N)
?";
965 X$=INKEY$:IFX$="Y"THENRUN
970 IFX$="N"THENCLS:END
975 GOTO965
```

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Its about time you got organized

Do You Have The Time?

by Jonathan Saksa

You were one of those last-minute Christmas shoppers who were slowly convinced that the season to be jolly was someone's idea of a cruel joke. The past couple of months have magnified your procrastinating tendencies and overall disorganized way of life. And you actually believe a new year's resolution will change things. Get a grip. You probably don't even have time to organize your time — but *Calendar* does.

Calendar is a BASIC09 program written to run under OS-9 Level II. To run the program, make sure you are operating from an 80-by-24 text or graphics screen. Before starting the program, use the `chd` command to select the directory in which the calendar file will be stored. Make sure `gfx2` is in the current execution directory or loaded into memory.

The program itself is menu-driven and uses arrow keys to make selections. Each selection is described as follows:

Jon Saksa uses the CoCo to write software for his dairy farm as well as for personal use. Since 0S-9 Level II became available, he uses BASIC09 exclusively. He can be contacted at Rt. 1, Box 86, Annandale, MN 55302

0S-9 Level II

Listing 1: `calendar`

```
PROCEDURE calendar
 0000       (* Calendar (c) Oct. 31, 1989
 001D       (* Jonathan Saksa
 002E       (* Rt. 1 Box 86
 003D       (* Annandale, Mn. 55302
 0054       DIM day_of_year,first_day:INTEGER; record(60):STRING[50]
 006F       DIM i,hour,min,date,mth,year:INTEGER
 008A       DIM day(7):STRING[3]; directory:STRING[29]
 00A6       DIM xpos,t_opts,select:BYTE; choices(7),title:STRING[20]
 00C9       DIM ypos,fcolor,bcolor:BYTE
 00D8       DIM Dirpath:STRING[40]
 00E4       DIM que:STRING[1]
 00F0       RUN gfx2("clear")
 00FD       RUN get_date(hour,min,date,mth,year)
 011B       day_of_year:=0
 0122       RUN iniz_cal(day_of_year,first_day,mth,year,day)
 0140       xpos:=55 \ypos:=3 \t_opts:=7
 0155       fcolor:=0 \bcolor:=1 \select:=1
 016A       title:="Menu"
 0175       choices(1):="Load File"
 0188       choices(2):="Edit File"
 019B       choices(3):="Save File"
 01AE       choices(4):="Change Month"
 01C4       choices(5):="Coming Events"
 01DB       choices(6):="Change Directory"
 01F5       choices(7):="Quit"
 0203 5     RUN menu(xpos,ypos,fcolor,bcolor,t_opts,select,choices,title)
 0233       ON select GOSUB 10,20,30,40,50,60,70
 0256       GOTO 5
 025A 10    RUN loadfile_cal(day_of_year,record)
 026C       RETURN
 026E 20    RUN editfile_cal(record,first_day,mth,year,day)
 028F       RUN gfx2("curxy",0,15)
 02A2       INPUT "Save edited calendar on disk (y/n)...",que
 02CF       IF que="y" OR que="Y" THEN
 02E4         GOSUB 30
 02E8       ENDIF
 02EA       RUN gfx2("curxy",0,15)
 02FD       RUN gfx2("erline")
 030B       RETURN
 030D 30    RUN savefile_cal(day_of_year,record) \ RETURN
 0321 40    RUN chgmonth_cal(day_of_year,first_day,mth,year,day)
 0342       RETURN
 0344 50    RUN event_cal(record,first_day,day_of_year,date,mth,year,day)
 036F       RETURN
 0371 60   RUN gfx2("curxy",0,15)
 0387      INPUT "Enter new directory path: ",Dirpath \ CHD Dirpath
 03AE      RUN gfx2("curxy",0,15)
 03C1      RUN gfx2("erline")
 03CF      RETURN
 03D1 70   END
 03D6      END
PROCEDURE menu
 0000      PARAM Xpos,Ypos,fcolor,bcolor,Total_options,Select:BYTE
 001B      PARAM Choices(20),Title:STRING[20]
 0030      DIM Count:INTEGER; Que:BYTE
 003D      DIM C,R,First_choice,Selection,Ysize:INTEGER
 0054      ON ERROR GOTO 10
 005A      SHELL "tmode -echo"
 0069      R:=2
 0070      First_choice:=R+2
 007B      Ysize:=Total_options+10
 0086      C:=1
 008D      RUN gfx2("owset",1,Xpos,Ypos,20,Ysize,fcolor,bcolor)
 00B9      PRINT " "; DATE$
 00C0      RUN gfx2("curxy",C,R)
 00D7      PRINT TAB(C+10-LEN(TRIM$(Title))/2-C); Title
 00F1      R:=R+2
 00FC      FOR Count=1 TO Total_options
 010D        RUN gfx2("curxy",C,R)
 0124        PRINT Count; " "; Choices(Count)
 0134        R:=R+1
 013F      NEXT Count
 014A      R:=R+1
 0155      RUN gfx2("curxy",C-1,R)
 016E      PRINT "Current directory:  ";
 0187      SHELL "pwd" \R:=R+2
 0199      Selection:=Select-1
 01A4      RUN gfx2("curxy",C-1,R)
 01BD      RUN gfx2("erline")
 01CB      PRINT
 01CD      PRINT "Use the arrow keys"
 01E3      RUN gfx2("curxy",C-1,R+2)
```

Load file — Used to load the current month's date file so you can enter or edit *Calendar* information.

> It provides an easy way to see the upcoming calendar for the next two weeks from the current date set when booting OS-9. It also looks back several weeks in your calendar to see if there were any reminders that you still want called up .

Edit file — Employs a simple screen editor to work with the date records. The editor is always in Insert mode, which

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makes it easy to edit records but clumsy to type them in the first time because any wrong character must be deleted before being retyped. The end of the record is cut off if more than 45 characters are forced into the record.

Save file — Must be used after editing to save any changes made. It saves only that portion of the file loaded previously.

Change month — Lets you select any month of the year to load in for editing.

Coming events — Provides an easy way to see the upcoming calendar for the next two weeks from the current date set when booting OS-9. It also looks back several weeks in your calendar to see if there were any reminders that you still want called up (more on that later).

Quit — Exits the program and returns you to the OS-9 command line.

One special feature of the program is that when you load a file for a current month, it also loads the last two weeks from the previous month and the first two weeks from the upcoming month. This provides a total of 60 days that can be edited from one loading, which is especially nice since some events such as paying bills occur close to the same day each month.

The reminder feature is also interesting. By inserting an asterisk (*) anywhere in the record for any day, you can call up a record in the reminders section when using the Coming Events selection. This happens only if the event occurs in the previous two weeks from the current day. For example, the option can be used when you want to be continually reminded to buy a birthday present for someone — procrastinators will love this.

The `calendar_file` is an empty file except for the first five bytes of each record that contain the date in the format `01/01`. The record is 50 bytes long with 45 bytes available for the user.

The `curr_cal` program can be used in the startup file or as a stand-alone program to display the previous seven days for any reminders activated with an asterisk. It also looks ahead seven days. No editing can be done with this program.

The `createfile_cal` program creates the original empty `calendar_file` in the current directory. This sets up all the month/day records with 45 bytes of space reserved for the user.

One extra benefit is that the menu portion can be used in other BASIC09 programs by following the same parameters I've used here. ❑

```
 01FE       PRINT "Press <ENTER>";
 0210       REPEAT
 0212         RUN gfx2("curxy",C,Selection+First_choice)
 022C         RUN gfx2("revon")
 0239         PRINT Selection+1;
 0242         RUN gfx2("curxy",C-1,Selection+First_choice)
 025E         RUN gfx2("revoff")
 026C         GET #0,Que
 0275       EXITIF Que-48>0 AND Que-48<=Total_options THEN
 028F         Selection:=Que-49
 029A       ENDEXIT
 029E         PRINT " "; Selection+1;
 02AB         IF Que=$0A THEN  \REM down arrow
 02C5           Selection:=MOD(Selection+1,Total_options)
 02D4         ENDIF
 02D6         IF Que=$0C THEN  \REM up arrow
 02EE           Selection:=MOD(Selection-1,Total_options)
 02FD           IF Selection<0 THEN
 0309             Selection=Total_options-1
 0314           ENDIF
 0316         ENDIF
 0318       UNTIL Que=$0D \REM enter key
 0330       PRINT CHR$(12)
 0335       SHELL "tmode echo"
 0343       Select=Selection+1
 034E       RUN gfx2("owend")
 035B       END
 035D 10    SHELL "tmode echo"
 036E       RUN gfx2("owend")
 037B       END
\PROCEDURE iniz_cal
 0000       PARAM day_of_year,first_day,mth,year:INTEGER; day(7):STRING[3]
 0023       DIM daycode(26),yearcode:INTEGER
 0033       DIM days_in_month(12),i:INTEGER; month(12):STRING[9]
 0053       DIM year_real:REAL
 005A       FOR i:=1 TO 26
 006A         READ daycode(i)
 0073       NEXT i
 007E       DATA 2,3,4,5,7,1,2,3,5,6,7,1,3,4,5,6,1,2,3,4
 00BE       DATA 6,7,1,2,4,5
 00D4       FOR i:=1 TO 12
 00E4         READ days_in_month(i)
 00ED         READ month(i)
 00F6       NEXT i
 0101       DATA 31,"January",28,"February",31,"March",30,"April"
 0136       DATA 31,"May",30,"June",31,"July",31,"August",30,"September"
 0172       DATA 31,"October",30,"November",31,"December"
 019F       FOR i:=1 TO 7
 01AF         READ day(i)
 01B8       NEXT i
 01C3       DATA "Sun","Mon","Tue","Wed","Thu","Fri","Sat"
 01F1       year:=1900+year \yearcode:=year-1984
 0209       day_of_year:=0
 0210       FOR i:=1 TO mth-1
 0224         day_of_year:=day_of_year+days_in_month(i)
 0233       NEXT i
 023E       year_real:=year
 0247       IF INT(year_real/4)=year_real/4 THEN
 025D         IF mth>2 THEN
 0269           day_of_year:=day_of_year+1
 0274         ENDIF
 0276       ENDIF
 0278       first_day:=day_of_year+1-INT(day_of_year/7)*7
 0291       first_day:=first_day+daycode(yearcode)
 02A0       IF first_day>7 THEN
 02AC         first_day:=first_day-7
 02B7       ENDIF
 02B9       PRINT CHR$(12);
 02BF       RUN print_cal(days_in_month(mth),first_day,year,mth,month(mth),day)
 02E8       END
PROCEDURE get_date
 0000       PARAM hour,min,day,month,year:INTEGER
 0017       hour:=VAL(MID$(DATE$,10,2))
 0024       min:=VAL(MID$(DATE$,13,2))
 0031       month:=VAL(MID$(DATE$,4,2))
 003E       day:=VAL(MID$(DATE$,7,2))
 004B       year:=VAL(MID$(DATE$,1,2))
 0058       END
PROCEDURE print_cal
 0000       PARAM days,first_day,year,mth:INTEGER
 0013       PARAM month:STRING[9]; day(7):STRING[3]
 002F       DIM y,i,dow:INTEGER
 003E       dow:=first_day
 0046       SHELL "tmode -pause"
 0056       RUN gfx2("curoff")
 0064       RUN gfx2("curxy",7,1)
 0077       PRINT month;
 007D       RUN gfx2("curxy",42,1)
 0090       PRINT year
 0095       FOR i:=1 TO 7
 00A5         RUN gfx2("curxy",i*6+1,3)
 00BF         PRINT day(i)
 00C7       NEXT i
 00D2       y:=4
 00D9       FOR i:=1 TO days
 00EA         RUN gfx2("curxy",dow*6+1,y)
 0106         dow:=dow+1
 0111         IF dow>7 THEN
 011D           dow:=1
 0124           y:=y+2
 012F         ENDIF
 0131         PRINT i
 0136       NEXT i
 0141       RUN gfx2("curon")
 014E       SHELL "tmode pause"
 015D       END
PROCEDURE loadfile_cal
 0000       PARAM day_of_year:INTEGER; record(60):STRING[50]
 0017       DIM first_record,i,path:INTEGER
 0026       first_record:=day_of_year-15
 0031       IF first_record<0 THEN
 003D         first_record:=first_record+365
 0049       ENDIF
 004B       OPEN #path,"calendar_file":READ
 0063       SEEK #path,50*first_record
 0070       FOR i:=1 TO 60
 0080         IF i+first_record=366 THEN
 0091           SEEK #path,0
 009A         ENDIF
 009C         GET #path,record(i)
 00AA        record(i):=record(i)+"                                                  "
 00EF       NEXT i
 00FA       CLOSE #path
 0100       END
PROCEDURE savefile_cal
 0000       PARAM day_of_year:INTEGER
 0007       PARAM record(60):STRING[50]
 0018       DIM first_record,i,path:INTEGER
 0027       first_record:=day_of_year-15
 0032       IF first_record<0 THEN
 003E         first_record:=first_record+365
 004A       ENDIF
 004C       OPEN #path,"calendar_file":WRITE
 0064       SEEK #path,50*first_record
 0071       FOR i:=1 TO 60
 0081         IF i+first_record=366 THEN
 0092           SEEK #path,0
 009B         ENDIF
 009D         PUT #path,record(i)
 00AB       NEXT i
 00B6       CLOSE #path
 00BC       END
PROCEDURE editfile_cal
 0000       PARAM record(60):STRING[50]
 0011       PARAM first_day,mth,year:INTEGER; day(7):STRING[3]
 0030       DIM que:STRING[1]
 003C       DIM x,y,page:INTEGER
 004B       RUN gfx2("owset",1,0,0,80,24,0,1)
 006D       RUN gfx2("curxy",0,22)
 0080    PRINT "  f1..delete line   ctrl f1..quit editing   f2..delete character"
 00C7      PRINT "          shift up..prev. page            shift down..next page";
 0108       SHELL "tmode -pause -echo"
 011E       page:=0 \x:=9 \y:=1
 0133       RUN printfile_cal(record,page,first_day,mth,year,day)
 0156       RUN gfx2("curxy",x,y)
 016D       LOOP
 016F         GET #0,que
 0178       EXITIF que=CHR$(181) THEN
 0185       ENDEXIT
 0189         IF que=CHR$(177) THEN
 0196           RUN delrec_cal(record(y+page),x,y)
 01B1         ENDIF
 01B3         IF que=CHR$(178) THEN
 01C0           RUN delchar_cal(record(y+page),x,y)
 01DB         ENDIF
 01DD         IF que=CHR$(26) THEN
 01EA           RUN uppage_cal(page)
 01F4           RUN printfile_cal(record,page,first_day,mth,year,day)
 0217         ENDIF
 0219         IF que=CHR$(28) THEN
 0226           RUN downpage_cal(page)
 0230           RUN printfile_cal(record,page,first_day,mth,year,day)
 0253         ENDIF
 0255         IF que>=CHR$(8) AND que<=CHR$(13) THEN
 026A           RUN movecur_cal(que,x,y)
 027E         ENDIF
 0280         IF ASC(que)>=32 AND ASC(que)<=128 THEN
 0295           RUN chgfile_cal(record(y+page),x,y,que)
 02B5           x:=x+1
 02C0         ENDIF
 02C2         RUN gfx2("curxy",x,y)
 02D9       ENDLOOP
 02DD       SHELL "tmode pause echo"
 02F1       RUN gfx2("owend")
```

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FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

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Please do not submit material currently submitted to another publication.

```
 02FE       RUN gfx2("curxy",0,22)
 0311       END
PROCEDURE uppage_cal
 0000       PARAM page:INTEGER
 0007       page:=page+20
 0012       IF page>40 THEN
 001E         page:=40
 0025       ENDIF
 0027       END
PROCEDURE downpage_cal
 0000       PARAM page:INTEGER
 0007       page:=page-20
 0012       IF page=-20 THEN
 001F         page:=0
 0026       ENDIF
 0028       END
PROCEDURE chgfile_cal
 0000       PARAM record:STRING[50]; x,y:INTEGER
 0016       PARAM que:STRING[1]
 0022       record:=LEFT$(record,x-4)+que+RIGHT$(record,50-(x-4))
 0043       IF x>53 THEN
 004F         x:=53
 0056       ENDIF
 0058       RUN gfx2("curxy",4,y)
 006D       PRINT record
 0072       END
PROCEDURE movecur_cal
 0000       PARAM que:STRING[1]; x,y:INTEGER
 0016       ON ASC(que)-7 GOSUB 10,20,30,40,50,60
 0039       RUN gfx2("curxy",x,y)
 0050       END
 0052 10    x:=x-1
 0060       IF x<9 THEN
 006C         x:=53
 0073       ENDIF
 0075       RETURN
 0077 20    x:=x+1
 0085       IF x>53 THEN
 0091         x:=9
 0098       ENDIF
 009A       RETURN
 009C 30    y:=y+1
 00AA       IF y>20 THEN
 00B6         y:=1
 00BD       ENDIF
 00BF       RETURN
 00C1 40    RETURN
 00C6 50    y:=y-1
 00D4       IF y<1 THEN
 00E0         y:=20
 00E7       ENDIF
 00E9       RETURN
 00EB       END
 00ED 60    x:=9 \y:=y+1
 0102       IF y>20 THEN
 010E         y:=1
 0115       ENDIF
 0117       RETURN
PROCEDURE printfile_cal
 0000       PARAM record(60):STRING[50]; page:INTEGER
 0017       PARAM first_day,mth,year:INTEGER; day(7):STRING[3]
 0036       DIM day_of_week,i:INTEGER
 0041       DIM year_real:REAL
 0048       day_of_week:=first_day-1
 0053       year_real:=1900+year
 0060       IF INT(year_real/4)=year_real/4 THEN
 0076         IF mth>2 THEN
 0082           day_of_week:=day_of_week+1
 008D         ENDIF
 008F       ENDIF
 0091       IF day_of_week<1 THEN
 009D         day_of_week:=7
 00A4       ENDIF
 00A6       IF page=20 THEN
 00B2         day_of_week:=day_of_week-1
 00BD         IF day_of_week<1 THEN
 00C9           day_of_week:=day_of_week+7
 00D4         ENDIF
 00D6       ENDIF
 00D8       IF page=40 THEN
 00E4         day_of_week:=day_of_week-2
 00EF         IF day_of_week<1 THEN
 00FB           day_of_week:=day_of_week+7
 0106         ENDIF
 0108       ENDIF
 010A       FOR i:=1 TO 20
 011A         RUN gfx2("curxy",0,i)
 012F         PRINT day(day_of_week); " ";
 013C         PRINT record(i+page)
 0148         day_of_week:=day_of_week+1
 0153         IF day_of_week>7 THEN
 015F           day_of_week:=1
```

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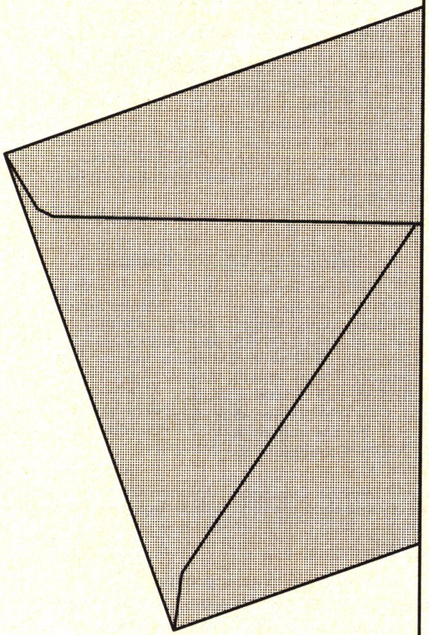

```
 0166         ENDIF
 0168       NEXT i
 0173       END
PROCEDURE delchar_cal
 0000       PARAM record:STRING[50]; x,y:INTEGER
 0016       record:=LEFT$(record,x-4)+RIGHT$(record,50-(x-4+1))
 0036       RUN gfx2("curxy",4,y)
 004B       record:=record+" "
 0057       PRINT record
 005C       END
PROCEDURE delrec_cal
 0000       PARAM record:STRING[50]; x,y:INTEGER
 0016      record:=LEFT$(record,5)+"                                             "
 0053       RUN gfx2("curxy",4,y)
 0068       PRINT record
 006D       END
PROCEDURE chgmonth_cal
 0000       PARAM day_of_year,first_day,mth,year:INTEGER; day(7):STRING[3]
 0023       DIM que:STRING[1]
 002F       PRINT CHR$(12) 0034      PRINT "Current month is set at: "; mth
 0055       INPUT "                    Change to: ",mth
 0076       year:=year-1900
 0082       RUN iniz_cal(day_of_year,first_day,mth,year,day)
 00A0       END
PROCEDURE event_cal
 0000       PARAM record(60):STRING[50]
 0011      PARAM first_day,day_of_year,date,mth,year:INTEGER; day(7):STRING[3]
 0038       DIM que,que_temp:STRING[1]; path:BYTE
 004E       DIM day_of_week,i:INTEGER
 0059       DIM year_real:REAL
 0060       RUN gfx2("owset",1,0,0,80,24,0,1)
 0082       RUN io_cal(que,path)
 0091       que_temp:=que
 0099       RUN loadfile_cal(day_of_year,record)
 00A8       first_record:=date+1
 00B4       day_of_week:=MOD(date+first_day-1,7)
 00C6       year_real:=1900+year
 00D3       IF INT(year_real/4)=year_real/4 THEN
 00E9         IF mth>2 THEN
 00F5           day_of_week:=day_of_week+1
 0100         ENDIF
 0102       ENDIF
 0104       IF day_of_week<1 THEN
 0110         day_of_week:=day_of_week+7
 011B       ENDIF
 011D       PRINT #path,"Overdue reminders:" \ PRINT #path
 013E       FOR i:=first_record TO first_record+13
 0156         IF SUBSTR("*",record(i))<>0 THEN
 0169           PRINT #path,day(day_of_week); " ";
 017B           PRINT #path,record(i)
 0188         ENDIF
 018A         day_of_week:=day_of_week+1
 0195         IF day_of_week>7 THEN
 01A1           day_of_week:=1
 01A8         ENDIF
 01AA       NEXT i
 01B5       PRINT #path, \ PRINT #path,"Upcoming Calendar:" \ PRINT #path,
 01DE       FOR i:=first_record+14 TO first_record+27
 01FA         PRINT #path,day(day_of_week); " ";
 020C         PRINT #path,record(i)
 0219         day_of_week:=day_of_week+1
 0224         IF day_of_week>7 THEN
 0230           day_of_week:=1
 0237         ENDIF
 0239       NEXT i
 0244       PRINT #path, \ PRINT #path,
 0252       PRINT #1,"Press any key to continue";
 0274       GET #0,que
 027D       RUN gfx2("owend")
 028A       IF que_temp<>"s" THEN
 0297         CLOSE #path
 029D       ENDIF
 029F       END
PROCEDURE io_cal
 0000       PARAM que:STRING[1]; path:BYTE
 0012       DIM pathname:STRING[29]
 001E       PRINT  \ PRINT "<S>creen, <P>rinter, or <F>ile? "
 0044       GET #0,que
 004D       PRINT CHR$(12)
 0052       IF que="s" THEN
 005F         path:=1
 0066       ELSE IF que="p" THEN
 0076           OPEN #path,"/p"
 0081         ELSE IF que="f" THEN
 0091             INPUT "Enter pathname: ",pathname
 00A9             CREATE #path,pathname:WRITE
 00B5           ENDIF
 00B7         ENDIF
 00B9       ENDIF
 00BB       END
 00BD
```

Listing 2: `curr_cal`

```
PROCEDURE curr_cal
 0000       (* Curr_cal (c) Oct. 31,1989
 001C       (* Jonathan Saksa
 002D       (* Rt. 1 Box 86
 003C       (* Annandale, Mn. 55302
 0053       (* These procedures are designed to be used
 007E       (* in the startup file after the current
 00A6       (* date has been set
 00BA       (* Make sure you select the current directory that
 00EC       (* holds the calendar_file
 0106       (* Example:
 0111       (* Setime </term
 0121       (* chd /dd/my_calendar_directory
 0141       (* Curr_cal
 014C       (* These 5 files must be packed into your CMDS directory
 0184       (* as Curr_cal
 0192       DIM doy,first_day:INTEGER; record(60):STRING[50]
 01AD       DIM i,hour,min,date,mth,year:INTEGER
 01C8       DIM day(7):STRING[3]; directory:STRING[29]
 01E4       DIM xpos,t_opts,select:BYTE; choices(6),title:STRING[20]
 0207       DIM ypos,fcol,bcol:BYTE
 0216       RUN get_date(hour,min,date,mth,year)
 0234       doy:=0
 023B       RUN iniz_cal(doy,first_day,mth,year,day)
 0259       RUN event_cal(record,first_day,doy,date,mth,year,day)
 0281       END

PROCEDURE iniz_cal
 0000       PARAM doy,first_day,mth,year:INTEGER; day(7):STRING[3]
 0023       DIM daycode(26),yearcode:INTEGER
 0033       DIM dinm(12),i:INTEGER; month(12):STRING[9]
 0053       DIM year_real:REAL
 005A       FOR i:=1 TO 26
 006A         READ daycode(i)
 0073       NEXT i
 007E       DATA 2,3,4,5,7,1,2,3,5,6,7,1,3,4,5,6,1,2,3,4
 00BE       DATA 6,7,1,2,4,5
 00D4       FOR i:=1 TO 12
 00E4         READ dinm(i)
 00ED         READ month(i)
 00F6       NEXT i
 0101       DATA 31,"January",28,"February",31,"March",30,"April"
 0136       DATA 31,"May",30,"June",31,"July",31,"August",30,"September"
 0172       DATA 31,"October",30,"November",31,"December"
 019F       FOR i:=1 TO 7
 01AF         READ day(i)
 01B8       NEXT i
 01C3       DATA "Sun","Mon","Tue","Wed","Thu","Fri","Sat"
 01F1       year:=1900+year \yearcode:=year-1984
 0209       doy:=0
 0210       FOR i:=1 TO mth-1
 0224         doy:=doy+dinm(i)
 0233       NEXT i
 023E       year_real:=year
 0247       IF INT(year_real/4)=year_real/4 THEN
 025D         IF mth>2 THEN
 0269           doy:=doy+1
 0274         ENDIF
 0276       ENDIF
 0278       first_day:=doy+1-INT(doy/7)*7
 0291       first_day:=first_day+daycode(yearcode)
 02A0       IF first_day>7 THEN
 02AC         first_day:=first_day-7
 02B7       ENDIF
 02B9       END

PROCEDURE get_date
 0000       PARAM hour,min,day,month,year:INTEGER
 0017       hour:=VAL(MID$(DATE$,10,2))
 0024       min:=VAL(MID$(DATE$,13,2))
 0031       month:=VAL(MID$(DATE$,4,2))
 003E       day:=VAL(MID$(DATE$,7,2))
 004B       year:=VAL(MID$(DATE$,1,2))
 0058       END

PROCEDURE loadfile_cal
 0000       PARAM doy:INTEGER; record(60):STRING[50]
 0017       DIM first_record,i,path:INTEGER
 0026       first_record:=doy-15
 0031       IF first_record<0 THEN
 003D         first_record:=first_record+365
 0049       ENDIF
 004B       OPEN #path,"calendar_file":READ
 0063       SEEK #path,50*first_record
 0070       FOR i:=1 TO 60
 0080         IF i+first_record=366 THEN
 0091           SEEK #path,0
 009A         ENDIF
```

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```
 009C        GET #path,record(i)
 00AA       record(i):=record(i)+"                                             "
 00EF       NEXT i
 00FA       CLOSE #path
 0100       END

PROCEDURE event_cal
 0000       PARAM record(60):STRING[50]
 0011       PARAM first_day,doy,date,mth,year:INTEGER; day(7):STRING[3]
 0038       DIM que,que_temp:STRING[1]; path:BYTE
 004E       DIM dow,i:INTEGER
 0059       DIM year_real:REAL
 0060       RUN loadfile_cal(doy,record)
 006F       first_record:=date+1
 007B       dow:=MOD(date+first_day-1,7)
 008D       year_real:=1900+year
 009A       IF INT(year_real/4)=year_real/4 THEN
 00B0         IF mth>2 THEN
 00BC           dow:=dow+1
 00C7         ENDIF
 00C9       ENDIF
 00CB       IF dow<1 THEN
 00D7         dow:=dow+7
 00E2       ENDIF
 00E4       PRINT "Overdue reminders:" \ PRINT
 00FC       FOR i:=first_record TO first_record+13
 0114         IF SUBSTR("*",record(i))<>0 THEN
 0127           PRINT day(dow); " ";
 0134           PRINT record(i)
 013C         ENDIF
 013E         dow:=dow+1
 0149         IF dow>7 THEN
 0155           dow:=1
 015C         ENDIF
 015E       NEXT i
 0169       PRINT  \ PRINT "Upcoming Calendar:" \ PRINT
 0183       FOR i:=first_record+14 TO first_record+21
 019F         PRINT day(dow); " ";
 01AC         PRINT record(i)
 01B4         dow:=dow+1
 01BF         IF dow>7 THEN
 01CB           dow:=1
 01D2         ENDIF
 01D4       NEXT i
 01DF       END
```

Listing 3: `createfile_cal`

```
PROCEDURE createfile_cal
 0000       (* Createfile_cal (c) Oct. 31, 1989
 0023       (* Jonathan Saksa
 0034       (* Rt. 1 Box 86
 0043       (* Annandale, Mn. 55302
 005A       (* This procedure only needs to be used once
 0086       (* To produce an empty calendar_file
 00AA       (* in your current data directory
 00CB       DIM days_in_month(12):INTEGER
 00D7       DIM path:BYTE; i,j:INTEGER; month,day:STRING[3]
 00F7       DIM record:STRING[50]
 0103       DIM que:STRING[1]
 010F       FOR i:=1 TO 12
 011F         READ days_in_month(i)
 0128       NEXT i
 0133       ON ERROR GOTO 10
 0139 5     CREATE #path,"calendar_file":WRITE
 0154       FOR i:=1 TO 12
 0164         month:=" "+STR$(i) \month:=RIGHT$(month,2)
 017C         FOR j:=1 TO days_in_month(i)
 0190           day:=" "+STR$(j) \day:=RIGHT$(day,2)
 01A8         record:=month+"/"+day+"                                        "
 01ED           day:="0"+STR$(j) \day:=RIGHT$(day,2)
 0205           PUT #path,record
 020F         NEXT j
 021A       NEXT i
 0225       CLOSE #path
 022B       END
 022D       DATA 31,28,31,30,31,30,31,31,30,31,30,31
 0255 10    IF ERR=218 THEN
 0262         INPUT "Erase current calendar_file (y/n)...",que
 028E         IF que="y" OR que="Y" THEN
 02A3           SHELL "del calendar_file"
 02B8           GOTO 5
 02BC         ENDIF
 02BE       ENDIF
 02C0       END
```

Corrections

"Hi-Res Graphics Utility" (November 1989, Page 41): Some of the characters were inadvertently deleted from the end of three of the lines. In Line 170 add `14D`, in Line 180 add `1B7`, and in Line 190 add `A8B`.

"Diary" (June 1989, Page 91): To be able to load the diary once it is saved, change Line 55 to read:

```
 55 IF LOF(1)<1 THEN 60 ELSE GET#
 1,2:INPUT #1,L$:LAG$=L$:GOTO 40
```

"Letter Carrier" (October 1989, Page 20): The author has recently moved. His new address is 118 Corlies Ave., Poughkeepsie, NY 12601.

"Donut Dilemma Review" (November 1989, Page 102): Because of a production error, the reviewer, Linda Manning, was not properly credited as having reviewed the product. We apologize for this oversight.

Lost and Found

by Greg Law
Technical Editor

Have you ever spent one of those dreary days looking for a particular disk that you just couldn't find? If you are anything like me, you tend to have hundreds of mostly unlabeled disks scattered about that contain remnants of zillions of pieces of data. To say the least, trying to find anything is like trying to find the proverbial needle in a haystack. This month has been particularly interesting since I have just moved and everything is still lying around in boxes. With that in mind, I thought this would be the perfect time to get organized. I started out with box after box of unknown disks and a handful of freshly formatted disks. I painstakingly copied each of the files to empty disks organized in such a way so that similar files are on the same disk. Then I attached disk labels to each. After a few days of moving files around, I finally had everything organized properly so that I could more easily find the files I needed. I quickly realized that disk labels tend to stick to everything with the exception of the disks they are intended for.

I then came across the perfect solution: `vol`, written by Joseph Cheek. This handy little utility allows you to view or change the volume name on any disk, even a hard drive. It is also very easy to use. Just load the source code into BASIC09 and execute the `pack` command to create the executable program. From then on, type `vol` and the program will guide you through by issuing several prompts.

The program is broken down into three procedures: `vol`, `ltou` and `printdate`. The first procedure, `vol`, begins by declaring the variables and two structures used. The `id` structure contains the date and time the disk was formatted along with the volume name of the disk. The `r` structure contains the 6809 microprocessor registers that are used to perform OS-9 system calls. The procedure obtains your user ID and the process ID with the statement `RUN syscall(ccode,r)`, using a calling code of 12 (`F$ID`), and stores the user ID into the `uid` variable. It then prints a short introduction followed by your user ID. If your user ID is zero, it also prints `(Superuser)` in reverse video.

The `REPEAT` loop at Offset 0189 first prompts you for the drive name. If you press ENTER, it will use either `/DD` or the last drive name you selected. This makes it easy to change the volume label on several disks since you don't have to type in the drive name every time. At Offset 01FC it opens the drive in Update mode and seeks to Byte 11 of LSN 0, which contains the user ID of

OS-9

The listing: `vol`

```
PROCEDURE vol
 0000       DIM diskname:STRING[32]
 000C       TYPE rec=year,mon,day,hour,min,name(32):BYTE
 0030       DIM id:rec
 0039       TYPE regs=cc,a,b,dp:BYTE; x,y,u:INTEGER
 005E       DIM r:regs
 0067       DIM drive,old:STRING[4]
 0077       DIM key:STRING[1]
 0083       DIM char,uid,did:INTEGER
 0092       DIM disk,ccode:BYTE
 009D       DIM vol:BOOLEAN
 00A4       ccode=12
 00AB       RUN syscall(ccode,r)
 00BA       uid=r.y
 00C5       r.a=1
 00D0       r.x=ADDR(diskname)
 00DE       ccode=139
 00E5       old="/dd"
 00EF       PRINT CHR$(12);
 00F5       PRINT "VOL OS9 disk volume name editor"
 0118       PRINT "Written by Joseph Cheek for CSS"
 013B       PRINT
 013D       PRINT "Your UID is "; uid;
 0152     IF uid=0 THEN PRINT " "; CHR$(31); " (Superuser)"; CHR$(31); "!"; CHR$(7);
 0182       ENDIF
 0184       PRINT "."
 0189       REPEAT
 018B         vol=TRUE
 0191         PRINT
 0193         PRINT "Drive name ["; old; "]";
 01AC         INPUT drive
 01B1         IF drive="" THEN drive=old
 01C4           PRINT "                   "; CHR$(9); old
 01E2         ELSE
 01E6           old=drive
 01EE         ENDIF
 01F0         drive=drive+"@"
 01FC         OPEN #disk,drive:UPDATE
 0208         SEEK #disk,11
 0211         GET #disk,did
```

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

the person who formatted the disk, and reads it into the `did` variable. Next it seeks to Byte 26, reads the date and time the disk was formatted and the volume name into the `id` structure, and closes the disk. The volume name has a maximum length of 32 characters, and the last character has the most significant bit set. That is, if the volume name of the disk is "Utilities," then the volume name contains the values shown in Figure 1.

```
      0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F 0123456789ABCDEF
     -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- ----------------
0000 55 74 69 6C 69 74 69 65 C3 00 00 00 00 00 00 00 Utilitie........
0010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
```

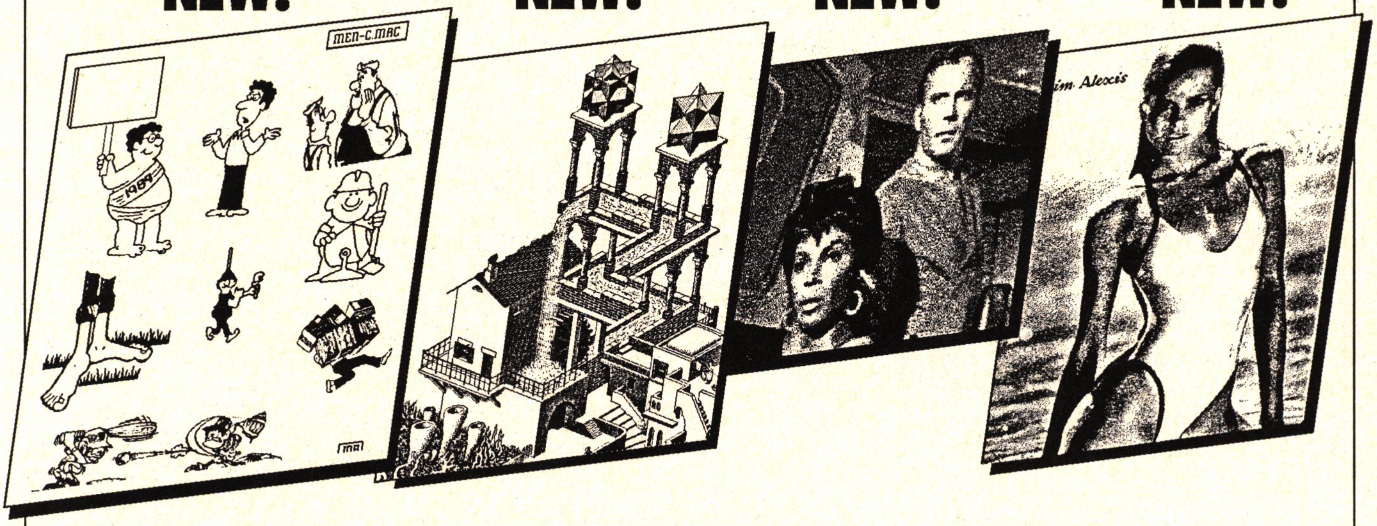
Figure 1

The `REPEAT` loop at Offset 0242 copies the volume name from `id.name` into `diskname`, stopping at either the character with the most significant bit set or at the 32nd character in the string. It also clears the most significant bit so that when it is printed on the screen, the last character will be printed as a printable character instead of some Greek value as shown above in the dump of the volume name.

The `IF` statement at Offset 027F compares the disk ID with your user ID. If they are not the same and you are the superuser, you are asked if you want to change the volume name anyway. If the disk ID is not the same as your user ID and you are not the superuser, you are not allowed to change the volume name; `vol` is set to `FALSE`.

According to the BASIC09 manual, you can print a quotation mark by placing two quotation marks within the string to be printed. This is what has been done in the `PRINT` statement at Offset 02FD. The end result is that it prints the volume name of the disk contained in quotation marks. For example, if your volume name is Utilities, `Volume: "Utilities"` is printed on the screen, followed by the date and time the disk was formatted. If `vol` is `TRUE`, you are asked if you want to change the volume name. If you do, the cursor is moved up one line, that line is erased, and you are prompted for the new volume name.

The `REPEAT` loop at Offset 03A1 reads the volume name you type in by executing the `syscall` module to perform the `I$ReadLn` system call. It was designed so that if you press ENTER without typing a volume name, it performs the loop again until you type in a volume name. It should copy the last character you typed in `diskname` to `key` and set the most significant bit. It should then strip off that char-



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acter from `diskname` and append the same character with the most significant bit set in `key` to `diskname`.

However, there is one minor problem with this approach. The `I$ReadLn` system call reads each keystroke as you type it and terminates the string with a carriage return when you press ENTER. The statement at Offset 03E9 copies the last character in the string into `key`, which should be the character immediately preceding the carriage return. Unfortunately this is not the case because BASIC09 expects the string to be terminated with $FF (Decimal 255). It actually searches all of memory until it finds $FF and then returns the character immediately preceding it. The author was attempting to get around a minor problem with BASIC09 where it writes the string, including the string terminator, to the disk. Although this is true, it writes only the maximum length of the string as it is dimensioned — 32 characters — so no harm is done.

As currently written, the program writes the volume name you typed in. However, the 32nd character has the most significant bit set, though it is not necessarily the last character you typed in. While this is harmless, it does write some very interesting volume names on the disks. I suggest replacing the line at Offset 03CE with `INPUT diskname`. The volume names written to disk are properly terminated when this is done.

Once the volume name is written, the disk is closed. You are asked if you want to view or change the volume name on another disk. The entire loop is repeated if you press Y, and the program ends if you press any other key.

The `ltou` procedure is used throughout the program to convert your yes or no responses into uppercase. It works by receiving the string to be converted into the parameter named `answer`. The `FOR` statement loops through each of the characters in `answer`, placing the ASCII value of each of the characters into `char`. If it is a lowercase character, it is converted to uppercase and appended to the end of `workstring`. If it is not a lowercase character, it is appended to the end of `workstring` without any conversion. Finally, the converted string is copied from `workstring` into `answer`, which is then returned to the procedure that called it.

The `printdate` procedure is fairly straightforward. It receives the date and time the disk was formatted into the parameters `year`, `month`, `day`, `hour`, and `minute`. It then prints the date and time so that each value has a leading zero if it is less than 10. This prints the date and time in a manner similar to `89/10/04 at 09:05`. ❑

```
 021B          SEEK #disk,26
 0224          GET #disk,id
 022E          CLOSE #disk
 0234          char=0
 023B          diskname=""
 0242          REPEAT
 0244            char=char+1
 024F            diskname=diskname+CHR$(LAND(id.name(char),127))
 0265          UNTIL char=32 OR id.name(char)>127
 027D          PRINT
 027F          IF did<>uid THEN PRINT “Not your disk.”
 029D            vol=FALSE
 02A3            IF uid=0 THEN PRINT “Change anyway [y/N]? “;
 02C8              GET #0,key
 02D1              RUN ltou(key)
 02DB              IF key=”Y” THEN
 02E8                vol=TRUE
 02EE              ENDIF
 02F0            ENDIF
 02F2          ENDIF
 02F4          IF vol THEN
 02FD            PRINT “Volume: “”; diskname; “””
 0312            PRINT “Created on “;
 0322            RUN printdate(id.year,id.mon,id.day,id.hour,id.min)
 034F            IF did=uid THEN
 035C              PRINT “Change volume name [y/N]? “;
 037B              GET #0,key
 0384              PRINT
 0386              RUN ltou(key)
 0390            ENDIF
 0392            IF key=”Y” THEN
 039F              PRINT
 03A1              REPEAT
 03A3                PRINT CHR$(9); CHR$(3);
 03AD                PRINT “New volume name: “;
 03C3                r.y=32
 03CE                RUN syscall(ccode,r)
 03DD              UNTIL LEN(diskname)>0
 03E9              key=RIGHT$(diskname,1)
 03F4              key=CHR$(LOR(ASC(key),128))
 0401              diskname=LEFT$(diskname,LEN(diskname)-1)+key
 0415              OPEN #disk,drive:WRITE
 0421              SEEK #disk,31
 042A              PUT #disk,diskname
 0434              CLOSE #disk
 043A            ELSE
 043E              vol=FALSE
 0444            ENDIF
 0446          ENDIF
 0448          IF vol THEN
 0451            PRINT “Done...another disk [y/N]? “;
 0471          ELSE
 0475            PRINT “Another disk [y/N]? “;
 048E          ENDIF
 0490          GET #0,key
 0499          PRINT
 049B          RUN ltou(key)
 04A5        UNTIL key<>”Y”
 04B1        END “Done.”

PROCEDURE ltou
 0000        DIM workstring:STRING[40]
 000C        DIM count:INTEGER
 0013        DIM char:BYTE
 001A        PARAM answer:STRING[40]
 0026        workstring=""
 002D        FOR count=1 TO LEN(answer)
 003F          char=ASC(MID$(answer,count,1))
 004E          IF char>96 AND char<123 THEN
 0061            char=char-32
 006C          ENDIF
 006E          workstring=workstring+CHR$(char)
 007B        NEXT count
 0086        answer=workstring
 008E        END

PROCEDURE printdate
 0000        PARAM year,month,day,hour,min:BYTE
 0017        PRINT year; “/”;
 0021        IF month<10 THEN PRINT “0”;
 0032        ENDIF
 0034        PRINT month; “/”;
 003E        IF day<10 THEN PRINT “0”;
 004F        ENDIF
 0051        PRINT day; “ at “;
 005E        IF hour<10 THEN PRINT “0”;
 006F        ENDIF
 0071        PRINT hour; “:”;
 007B        IF min<10 THEN PRINT “0”;
 008C        ENDIF
 008E        PRINT min; “.”
 0097        END
```

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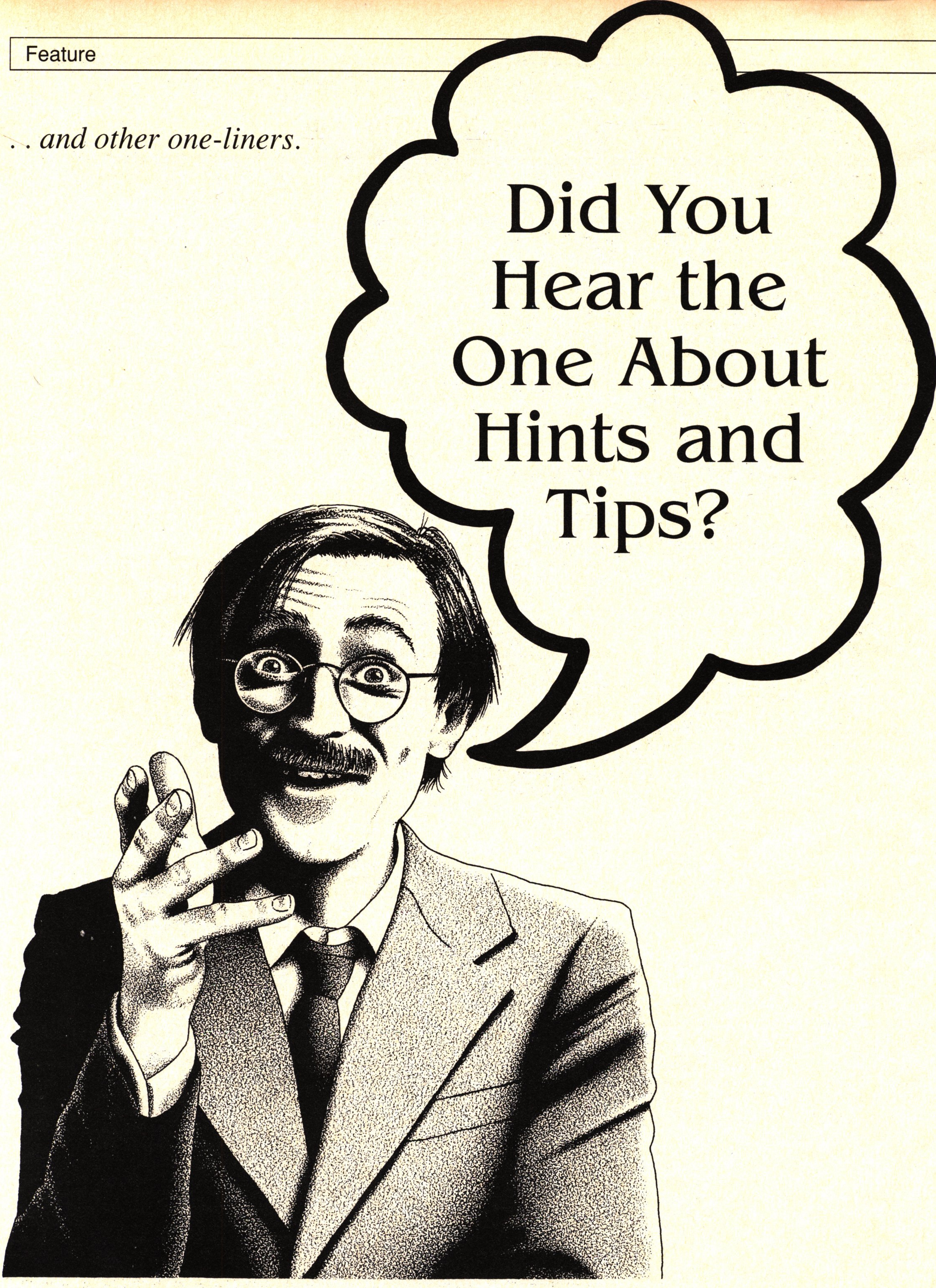
. . and other one-liners.



Did You Hear the One About Hints and Tips?

Many computer newcomers have little idea what to do with their new purchases once the excitement of `10 PRINT"HELLO ";:GOTO 10` wears off. Many have only a small idea of what their CoCos *can* do. Then there are those who want to accomplish a task not documented in Tandy's Extended BASIC manual — and they just can't seem to find a good way to go about it. Have no fear, beginner. Help is on the way.

Over its eight-and-a-half years of publication (and counting), THE RAINBOW has amassed a wide variety of hints and tips and one-line programs. These little words of wisdom and programming examples are sprinkled throughout past issues of THE RAINBOW, and readers consider them prizes.

Now, in the interest of sparking *your* interest, we have scoured our back issues for these all-important CoCo tidbits. We have grouped the most basic yet most meaningful items here for easy reference.

Of course if you are *not* a beginner (don't worry, we welcome all readers), you may have already seen many of these. Perhaps it is time for a review.

Whatever the case, you will enjoy these laughably easy CoCo shorts. Use them as you build your own CoCo repertoire.

Putting on the Brakes

When using the `STOP` command to debug your program, ask for the information you want before you request the `STOP` action. For instance:

```
10 INPUT"NUMBER",A
20 IF A=3 THEN Y=10:X=30
30 IF A=4 THEN Y=20:X=40
40 PRINT X;Y:STOP
```

Line 40 shows the format used. It saves typing in the print request after the `STOP` command functions. It's a little thing, but it has saved me many finger strokes.

Having RFI Problems?

If you are receiving interference in the CoCo's video display on your TV, there may be a simple answer. If the set has a 75-ohm input connector (for cable TV), you can use a phono jack to F-connector adapter (Radio Shack 278-255) to plug the CoCo directly into the TV without using the switch box. Check your TV's instruction manual for any special switches or jumpers that may have to be changed.

Format Your Printouts

Ted Cizadlo Selig, of Omaha, Nebraska, writes that this is "a utility I developed to generate a 32-column `LLIST` of a program. I find this helpful in locating typing errors in listings from THE RAINBOW. The program must have an ASCII file ready and generates a listing of the program with your specified line width." The program requires a disk drive.

The listing:

```
5 CLEAR500:CLS:INPUT"NUMBER OF C
HARS/LINE";CL
10 INPUT"FILE NAME WITH EXTENTIO
N(MUST BE IN ASCII FORMAT)";N$
20 C=0:F=1
30 OPEN"I",#1,N$
50 LINEINPUT #1,N$
60 IF EOF(1)=-1THEN F=0
70 X=LEN(A$)
75 IF X<=CL THEN 150 ELSE IF X=0
 THEN 50
90 N=1
100 FOR J=1 TO INT(X/CL+1)
110 PRINT#-2,MID$(A$,N,CL):C=C+1
120 N=N+CL
130 NEXT J
140 IF F THEN 50 ELSE CLOSE#1:EN
D
150 PRINT#-2,A$:C=C+1:IF F THEN
160 ELSE CLOSE#1:END
160 GOTO 50
170 CLOSE#1:END
```

Line Too Long?

If you find that a line in a listing you're typing in is too long, the reason might be that it was packed. When you type in a BASIC program line, the computer watches the length of the line; when the line is 240 characters in length, the computer refuses to accept more characters.

If you need to get a few more characters on the line, press ENTER to place what you've already typed into memory, then type `EDIT` and the line number followed by ENTER. Press X to move the cursor to the end of the line. Now you can type some more characters into the line. The Edit mode has its own length limit, so the computer will take a few more characters and stop again.

This trick does let you stretch your lines, but it often causes confusion when someone who doesn't know about it types in a program from a printed listing; if you cram too many additional characters into a line, you may also find that they will not list properly even though they are actually present. Finally, packed listings will not save in ASCII format properly. Because of these problems we don't recommend using this technique in programs intended for publication.

Disk or Cassette and I/O Errors?

Make sure that the disk drive(s) and cassette recorder are not on the left side of the TV set (or if they are, that they're at least half a foot or so away). This is because the flyback transformer (which is almost always on the left side of the TV) puts out a great deal of RFI that can interfere with cassette or disk operation.

Upside-Down Loading

If you're having problems with I/O Errors when loading programs from cassette, try reloading with the cassette recorder placed upside-down. It may not be technically refined, and it may not work, but when you're faced with the dreaded

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I/O, it's worth a try. Rick Bullon, who suggested this method, says it works for him 90 percent of the time.

Undocumented Commands

Here are a few `EDIT` subcommands that are not documented in the Extended BASIC manual. I found these when going through a Model I quick reference card and decided to try them. They are as follows:

A: Cancel all changes, list the line and continue editing.

Q: Cancel all changes, stop editing.

E: Keep changes and stop editing. (same as ENTER)

The A and Q can be very useful if you make a goof and don't want to try and piece together a line or retype it.

To Hex With Decimal

To convert Hex to decimal, enter `?&HXXXX`. To convert decimal to Hex, enter `?HEX$(YYYY)`. (This is where the four Xs equal the Hex number, while the four Ys equal the decimal number.)

Single Disk COPY

Here's a feature that can be invaluable for users with a single disk drive. The Radio Shack Disk Manual mentions that use of the `COPY` command requires two or more drives. This is not necessarily true. A single drive copy can be made by doing the following:

1) Insert disk with file to be copied into Drive 0.

2) Type `COPY “FILENAME/ext:0”` and press ENTER.

3) After one short beep a notice appears on the screen instructing the user to insert the destination disk.

4) Insert the destination disk and press ENTER.

Once completed, there are two copies of the program: one original and one on the destination disk.

This method works for all types of disk files, including machine language programs.

Automatic Lowercase

To move automatically into lowercase, type `POKE282,0`. To return to uppercase, use `POKE 282,1`.

No-List POKE

If you would like to keep your program from listing, use `POKE 383,158`. To return to normal listing, type `POKE 383,0`.

Slow Scrolling Through Orange

Here's a powerful little `POKE` for the CoCo 1 or 2 that slows your scrolling by creating a horizontal `LIST`. Type `POKE 359,60` and you'll see what we mean. Add a colon (:) and `SCREEN 0,1` and you'll be slow-scrolling across an orange screen. To return to the green screen at full tilt, just type `POKE 359,126`. These pokes do not work with the CoCo 3.

Computer Fatigue

One evening after a long period of use, my computer no longer recognized when a key was struck. A call to a local Radio Shack set me at ease. It seems that if one leaves the joysticks plugged in and conditions are right (or wrong, depending on your point of view), the joysticks sometimes block the keyboard signal. I unplugged them and had no more problem with my keyboard locking up.

Speed Up Your CoCo

You can double the speed at which CoCo 1 or 2 operates with a simple `POKE` statement entered either directly from the keyboard or within a program. The statement is `POKE 65495,0`. This will speed up your CPU. You can return the computer to normal speed again with `POKE 65494,0`. Use `POKE 65497,0` and `POKE 65496,0` for the CoCo 3.

Note that you cannot perform any Input/Output operations, such as saving the program to cassette, when the speedup is in effect. You may also lose temporary keyboard control. If this happens, simply press the Reset button to brings things back to normal.

Saving In ASCII

When you save programs, CoCo can perform this function in two ways: by using binary codes or actual letters and numbers (called ASCII).

Although it takes longer, ASCII sometimes is a more accurate way to save a program, especially when you may be transferring programs between systems.

To save in ASCII, simply add a comma and an A to the end of your `SAVE` instruction, like this: `CSAVE”PROGRAM”,A` and the ASCII save is done by the CoCo.

Achieving a New Effect

Here is a method for achieving a `PCLEAR 0` effect for Disk Extended Color BASIC. It is as follows:

1. On power-up, `POKE 25,14` and then `POKE 26,0`.
2. Type `NEW`.

Listen Up

So you've got an I/O Error on the first save of your favorite program, and you can't remember how far along in the tape the second save is. What to do? Just keep typing `CLOAD` until the second save finally comes up? Steve Lipps, of Circle City Software, has a better idea. If you put a little space between your saves, as many of us do, then you can listen for the second save: Use `AUDIO ON` and `MOTOR ON` and listen for the silent space. Then you can use `MOTOR OFF`. A method even faster than `MOTOR OFF` is to press any key and then press ENTER, creating a Syntax Error that stops the recorder. Then `CLOAD` the second save.

Print Out Disk Directory

If you have a long disk directory and want to see all of it or if you simply want to have a hard-copy printout of your directory, just `POKE 111,254:DIR` and the entire disk directory is printed on your printer — even if it is too long to be fully displayed on the screen.

Handy Label Printer

I simply got tired of seeing the handwritten labels on my disks. Some were very sloppy, and some were in different colors of ink. The following is a short program that prints out a nice-looking disk label. You can use gummed labels that feed through your printer or simply print them out on regular paper and then cut them out, using a glue stick to stick them on your disks.

Edit the following lines:

50 enter your name

60 enter the date

70 enter the software manufacturer's name if the label is for a copyrighted third-party program.

Format is for the Epson printer, and all `CHR$` commands should be changed to your printer's needs.

```
10 POKE150,1 ‘SETS UP 9600 BAUD
RATE
20 CLS
40 PRINT@32,”ENTER FILE NAME/NUM
BER”:INPUTA$
50 B$=”DISK OWNERS NAME”
60 C$=”DATE DISK FORMATTED”
70 D$=”SOFTWARE MFG’S TITLE”
80 PRINT#-2,CHR$(14);’DOUBLE WID
TH
90 PRINT#-2,CHR$(27);”G”;’DOUBLE
STRIKEMODE
100 PRINT#-2,CHR$(27);”E”;’SETS
EMPHASIZED MODE
110 PRINT#-2,A$
120 PRINT#-2,D$
125 PRINT#-2,CHR$(27);”F”;’CANCE
LSEMPHASIZED MODES
130 PRINT#-2,CHR$(15);’SETS COND
ENSEDMODE
140 PRINT#-2,B$
150 PRINT#-2,C$
160 PRINT#-2,CHR$(27);”E”;CHR$(1
);CHR$(4);’SETHORIZONTAL/VERT TA
B UNIT
165 PRINT#-2,CHR$(11) ‘VERTICAL
TAB MODE
170 CLS:GOTO40
```

Finding ML Addresses

You can find the address of a machine language, loaded-from-cassette program by peeking several addresses in memory.

To find the start address, use the command `PEEK (487)*256 + PEEK(488)`.

To find the end address, use the command `PEEK(126)*256 +PEEK(127)-1`.

To find the execute address, use `PEEK (157)*256 + PEEK(158)`.

Sugar Software

☞ New Calligrapher Graphics Clipix! ☜

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Set #7 Small: Roman, Italics, Cubes, etc;
Set #8 Novelty fonts;
Set #9 Gallant and Spartan;
Set #10 Several Roman fonts;
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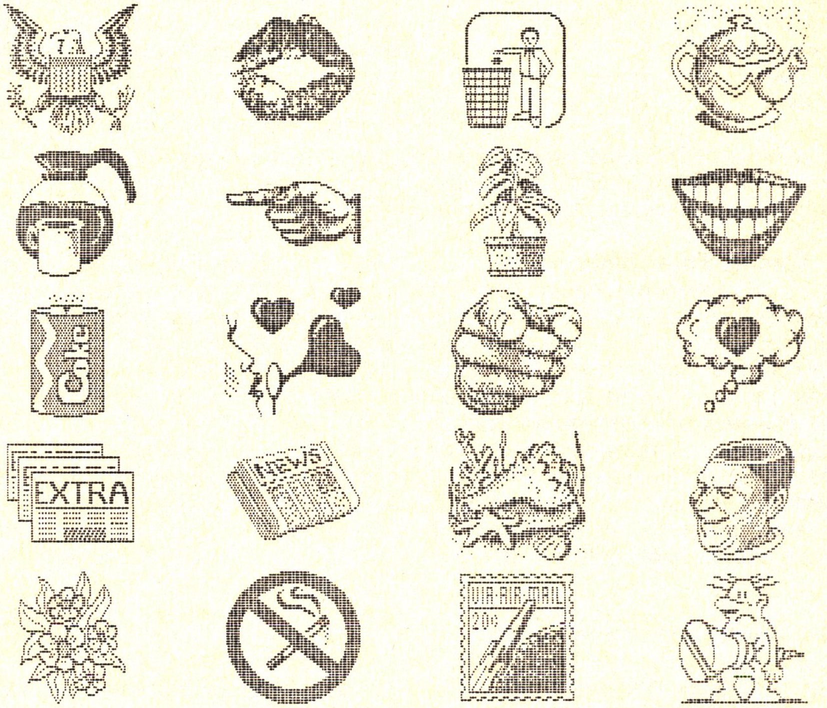
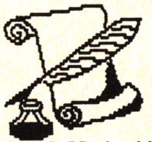
Calligrapher Combo Package - Includes the Calligrapher and any two Economy Font Packages (your choice) for only **$59.95.** Specify RS-DOS, OS9 or MS-DOS.

New! Calligrapher Graphics Clipix

The Calligrapher may now include graphics pictures, known as **Clipix**, along with the text it prints. There are currently 8 different Clipix disks available, each one has over 60 different graphic symbols. While the OS9/MS-DOS Calligrapher (especially V2.0) may easily combine both text and Clipix, the RS-DOS Calligrapher may also print out the Clipix. Clipix #1) **Sports**, #2, **Miscellaneous**, #3) **Occupations**, #4) **Occasions**, #5) **Vehicles**, #6) **KidStuff**, #7) **Astrology/Mythology**, #8) **Animals**. Each Clipix disk is **$9.95**. *See special offer above.*



The Font Massager - This program allows you to do many things to Calligrapher font and Clipix files. Create new fonts, modify existing fonts, invert and compress fonts, double the height and/or width, halve the height and/or width and convert between RS-DOS and OS9/MS-DOS formats. Specify OS9 or MS-DOS; **$19.95**.



This is a sample of the dot-matrix printer output from the OS9 MS-DOS Calligrapher set to full-justify the text within a 2.2 inch wide column. The font used is the 12-point Courier font from the font set #15 (or package #5).

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With all these commands, you must ask CoCo to print the addresses as well as work out the formula. You can use the commands either in a program or in direct mode from the keyboard.

RS-232 Baud Rates

These poke values for the CoCo create the 16 most commonly-used baud rates. They are as follows:

Baud Rate	`POKE 149`	`POKE 150`
50	4	88
75	2	227
110	1	246
134.5	1	153
150	1	110
300	0	180
600	0	87
1200	0	40
1800	0	25
2000	0	23
2400	0	18
3600	0	10
4800	0	7
7200	0	3
9600	0	1

To achieve 19,200 baud, you must use the pokes for 9600 baud and then use the high-speed poke to double the CoCo's speed.

Finding Those Bad Sectors

I have seen dozens of programs that find bad sectors and then isolate them from BASIC. Yet all use `DSKI$` and thus you always get I/O errors and have to manually continue the program to find other bad sectors. Below is a short program to find all bad sectors with no interruptions. Just enter it and type `RUN`. When the program finds a bad sector, it says so and then continues. Then you can use one of the dozens of programs already published to isolate that area.

```
10 DEFUSR0=PEEK(&HC004)*256+PEEK
(&HC005)
20 FOR T=0 TO 34:FOR S=1 TO 18
30 POKE 234,2:' SET TO READ
40 POKE 235,0:' DRIVE NUMBER
50 POKE 236,T:' TRACK
60 POKE 237,S:' SECTOR
70  POKE  238,14:'  DUMP  TO  THE
80  POKE  239,00:'  GRAPHICS  AREA
90 Y=USR0(0):P=PEEK(240)
100 IF P<>0 THEN PRINT “ERROR IN
 TRACK”;T;”- SECTOR”;S
110 NEXT S:NEXT T
```

Polling the Keyboard

If you need to wait for a key to be pressed before continuing on with a program, insert `EXEC 44539` at the desired point in the program. The computer will go on hold until any key is pressed.

Painting Must Be Accurate

When you issue a `PAINT` command, be sure that you set the point at which the painting is to begin within the area that is to be painted. If you set the position on a line that encloses the area, `PAINT` will not work.

Also when using `PAINT`, be sure your area is fully enclosed or the `PAINT` will leak out and cover the entire screen.

Does the Trick

After many failures by both Radio Shack in Texas and me to place `-upc` in the startup file (for OS-9), I received a call from the people there that did the trick. Add this to the startup file: `tmode .1 -upc`. So far, no problems have occurred.

Rest Your Weary Head

Before shutting down your disk system, use this command to move the drive head to Track 0:

```
DSKI$ 0,0,1,A$,B$
```

If you do this, the computer won't have to reposition the head to Track 0 the next time you use the system. This stops the noise of the drive moving the head back and forth.

One-Liners

☞ This one-liner shows how the notorious `PMODE 4` color artifacts create a color picture on your TV set or composite monitor using a black and white video signal. The display is also very nice to look at.

```
1 DIMA(11):W=20:FORC=4TO5:PMODE4
,1:PCLS:SCREEN1,1:GET(4,4)-(24,2
4),A,G:FORX=C TO228STEP2:Y=X*.75
:Z=174-Y:PUT(X,Y)-(X+W,Y+W),A,NO
T:PUT(X,Z)-(X+W,Z+W),A,NOT:PUT(X
,86)-(X+W,106),A,NOT:NEXT:FORT=1
TO500:NEXTT,C:FORB=1TO9999:NEXT
```

Mike Napolitan
W. Springfield, Massachussetts

☞ This program draws boxes of various sizes in one corner, then another and another and another. It then moves the designs over the screen using the `PCOPY` command.

```
0 PCLEAR8:PMODE4:SCREEN1:PCLS1:F
ORA=0TO3:DRAW”BM128,96C0A=A;”:FO
RZ=3TO68STEP2:N=Z/6+1:PLAY”L255V
31N=N;”:DRAW”R=Z;D=Z;L=Z;U=Z;BH3
“:NEXTZ,A:FORC=0TO20:FORS=0TO1:S
CREEN1:PMODE4,5-4*S:SOUNDRND(255
),1:FORY=1TO4:PCOPY Y+S*4TOY-4*(
Y<4)+1-4*S:NEXTY,S,C:RUN
```

Jacques Pannetier
Saint-Laurent, Quebec

☞ This is a handy one-liner that generates shopping lists and prints them on the printer. Just enter the name of the item and then a four-digit price (such as 01.92, 20.99 or 00.56). Always remember to get your printer ready before running the program.

```
1 DIMA$(100),B$(100):CLS:PRINT”S
HOPPING LIST GENERATOR”:PRINT”BY
 KEITH M. SCHULER”:PRINT:FORC=1T
O100:PRINT”ITEM #”;C;:INPUTA$(C)
:INPUT”PRICE(##.##)”;B$(C):IFA$(
C)<>””THENPRINT#-2,”—  $”;B$(C)
;”  “;A$(C):NEXT ELSEPRINT”SHOPP
ING LIST COMPLETE”
```

Keith Schuler
Merrit Island, Florida

☞ This one-liner sounds the Morse code for any letter key pressed. Wait until each character is complete before pressing the next key.

```
1 Y$=”?ETIANMSURWDKGOHVF?L?PJBXC
YZQ”:X$=INKEY$:IFX$=””THEN1ELSE:
X=2*INSTR(1,Y$,X$):X$=””:FORC=1T
O5:X=INT(X/2):X$=X$+CHR$(X+70):N
EXT:X=INSTR(1,X$,”G”):X$=LEFT$(X
$,X-1):FORC=LEN(X$)TO1STEP-1:G=A
SC(MID$(X$,C,1)):SOUND200,((G/2-
INT(G/2))*4+1)*2:NEXT:RUN
```

Keith Stamps
Prentiss, Missouri

☞ You can create 3-D animation on the CoCo! This shorty draws a cube over and over, rotating it a few degrees each time.

```
0 PMODE4:FORO=1TO4:X(O)=COS(A)*4
0+128:X(O+4)=X(O):Y(O)=SIN(A)*15
+75:Y(O+4)=Y(O)+42:A=A+1.6:NEXT:
A=A+1.3962:RESTORE:PCLS:FORO=1TO
12:READS,E:LINE(X(S),Y(S))-(X(E)
,Y(E)),PSET:NEXT:SCREEN1,1:GOTO:
DATA1,2,2,3,3,4,4,1,5,6,6,7,7,8,
8,5,1,5,2,6,3,7,4,8
```

Kraig Brockschmidt
Renton, Washington

☞ *Happyface* is a graphics animation program that shows an animated head with moving lips. This should entertain the kids for hours.

```
0 PMODE4:PCLS1:SCREEN1,1:COLOR4:
CIRCLE(128,96),96,,.9:CIRCLE(75,
60),15:PAINT(75,60):CIRCLE(180,6
0),15:PAINT(180,60):CIRCLE(128,8
4),15:FORR=1TO9:FORX=.02TO.4STEP
.02:CIRCLE(128,138),49,,X:NEXT:F
ORY=.4TO.02STEP-.02:CIRCLE(128,1
38),49,1,Y:NEXTY,R
```

Doug Wylie
Mentor, Ohio

☞ *Design* draws a box that shrinks and changes shape.

```
10 PMODE3,1:SCREEN1,1:PCLS:FOR Q
=1TO5:X1=0:Y=191:X3=255:FOR Z=1T
O 190:COLOR RND(8):LINE(X1,X1)-(
X3,Y),PSET,B:X1=X1+1:X3=X3-1:Y=Y
-1:NEXT Z,Q
```

Dan Wittig
Warren, Pennsylvania

☞ *Rollover* is a little gem that really shows off the graphics powers of the CoCo.

```
1 PMODE4,1:PCLS3:SCREEN1,1:FORX=
0T03:DRAW"BM128,96;S9C0A"+STR$(X
)+"BG2BF3G7NG2H8NG4E18NE4F8NE2G1
1H5NG2E2NH2E2NE2F5R3NF1NH1BG7NF1
NH1U4":PCLS3:DRAW"BL3L10NL3U12NL
6R26NR6D12NR3L16U7NL3R3NU3R3NR3D
7F4ND2NU2BL14ND2NU2E4":PCLS3:NEX
T:GOTO1
```

Ray H. Murray
Florissant, Colorado

☞ *Night Strike* is a neat little shoot-'em-up game. Center the enemy's chopper in your sights using the joystick and fire when ready. Caution: It isn't as easy as it sounds!

```
1 PMODE4:SCREEN1,1:PCLS:O=128:P=
96:C$="U1NL8NR8D1L1G1D1F1NG2R2NF
2E1U1H1NL1G1NR2NL2H1":FORJ=1TO10
00:PCLS:X=JOYSTK(0)*4:Y=JOYSTK(1
)*3:CIRCLE(X,Y),8:H=RND(10):V=RN
D(10):O=O+H-5:P=P+V-5:DRAW"S8BM"
+STR$(O)+","+STR$(P)+C$
2 Q=PEEK(65280):IFQ=127 ORQ=255O
RX+3<O ORX-3>O ORY+3<P ORY-3>PTH
ENNEXT:ELSEPOKE359,126:CLS:PRINT
"NIGHT-STRIKE REPORT:","ENEMYKIL
LED IN"J"MOVES","AGAIN (Y,N)";:I
NPUT D$:IFD$<>"Y"THENPRINT"MISSI
ON TERMINATED":END:ELSE RUN
```

Ric Small
Searcy, Arizona

☞ This one-liner animates a stick figure running across the screen. It demonstrates some principles of flicker-free animation, the use of a variable as a horizontal coordinate in a `DRAW` string (`=H;`), and the use of a short `PLAY` pause as a delay.

```
1 PCLEAR8:A$(1)="BR10U8NU6G4R3":
A$(3)="E8NU6D5E4":A$(2)="BU4E4R4
NU6F4R3":PMODE4,1:PCLS1:SCREEN1,
1:DRAW"BM0,96C0R255":FORX=240TO1
0 STEP-30:H=X:FORY=1TO3:PMODE0,6
:PCLS1:PMODE4,5:DRAW"C0BM=H;,95"
+A$(Y):PLAY"P120":PCOPY6TO2:H=H-
10:NEXT:NEXT:GOTO1
```

Stan Osterbauer
Sequim, Washington

☞ This program creates a cash register. It's great for those spring, summer and fall garage sales.

```
0 FORX=1TO99999:CLS:PRINT@41,"CA
SH REGISTER":INPUT"PRICE:";P:INP
UT"CASH TENDERED:";CT:PRINT:PRIN
T"YOU GET:":PRINT"     ";CT-P;"$
BACK IN CHANGE":RT=P+RT:INPUTD:I
FD<1THENNEXT X:ELSE PRINT"YOU MO
VED $";RT;" WORTH OF":PRINT"MERC
HANDISE!!"
```

Russ Rosen
Cardiff, California

☞ Pretend you are playing golf and putt the ball into the cup. Enter numbers from -2 to 5 to take aim.

```
10 S=30:Y=RND(188)+2:PMODE3:PCLS
:SCREEN1,0:CIRCLE(170,66),6,3,.5
:PAINT(170,66),3:FORI=1TOS:CIRCL
E(2,Y),3,2:NEXT:INPUTS:SCREEN1,0
:FORX=2TO173STEP7:CIRCLE(X,Y),3,
2:CIRCLE(X,Y),3,1:Y=Y-S:NEXT:IFY
<70ANDY>63THENPLAY"O2;L24;12;12;
O3;1;3;9;7;5":END:ELSERUN
```

Brad Lowe
Lafayette, California

☞ Type in *Scroller* as listed. Once you have seen what it does, change Line 1 to meet your own needs. This can be a pretty useful subroutine, too.

```
0 CLS:PRINT@257,STRING$(30,42):P
RINT@129,STRING$(30,42):Q=28:REA
DA$:FORX=1TOLEN(A$)+28:Q=Q-1:Q=Q
*SGN(Q):P$=MID$(A$,X+(Q-27),28-Q
):PRINT@194+Q,P$:FORT=1TO70:NEXT
T,X:RESTORE:GOTO
1 DATA DISPLAY ANY MESSAGE HERE
BY REPLACING THIS MESSAGE WITH O
NE OF YOUR OWN IN LINE NUMBER 1.
THE MESSAGE WILL BE REPEATEDLY
DISPLAYED AS LONG AS YOU LIKE.<>
```

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```
<><><><<<MESSAGE SCROLLER>>><<<B
Y JIM COCKRUM>>><><><><>
```

Jim Cockrum
Martinsville, Indiana

☞ *Calligraphy* simulates the use of a calligraphy pen. After you input the pen size needed, you can move the right joystick to control the pen's location.

```
1 IFF=0THENDEF FNP(Q)=(Q+4)/32-1
:CLS:INPUT"SIZE (1-10)";S:PMODE4
,1:PCLS1:SCREEN1,0:F=1:GOTO1ELSE
PSET(X,Y):X=ABS(X+FNP(JOYSTK(0))
):Y=ABS(Y+FNP(JOYSTK(1))):PRESET
(X,Y):IFPEEK(65280)=126ORPEEK(65
280)=254THENLINE(X,Y)-(X+S,Y-S),
PRESET:GOTO1ELSE1
```

Patrick S. Davis
Louisville, Kentucky

☞ You're locked in a car hurtling at high-speed through the canyons of doom—can you safely make it through? Use the right and left arrow keys to steer.

```
0 CLS:P=234:V=11:FORW=5TO1STEP-1
:FORN=1TOP:V=V+(RND(3)-2)*((V<>1
)*(V<>(30-W))):PRINT@480,STRING$
(V,128)STRING$(W,32)STRING$(31-V
-W,128):P=P-(PEEK(344)=247)+(PEE
K(343)=247):IFPEEK(P+1024)<>128T
HENPRINT@P,"V";:NEXTN,W:PRINT"YO
U WIN!"ELSEPRINT"CRASH!"
```

Robert M. Dickau
Sacramento, California

☞ This program automatically puts machine code into BASIC `DATA` statements. Just load the machine language code, `RUN` the program, set up a blank cassette to record, and input the start and end addresses of the code. When you `CLOAD` the resulting tape, your `DATA` lines are all complete.

```
10 CLS:PRINT"RECORDER ON?":INPUT
"START";B:INPUT"END";E:OPEN"O",#
-1,"DATA":Q=10:FORK=B TO E STEP8
:Q=Q+10:A$=STR$(Q)+" DATA ":FORJ
=0TO7:X$=STR$(PEEK(J+K))::A$=A$+
RIGHT$(X$,LEN(X$)-1+)",":NEXTJ:P
RINT#-1,LEFT$(A$,LEN(A$)-1):NEXT
K:CLOSE#-1:STOP
```

Dan Tandberg, M.D.
Albuquerque, New Mexico

☞ Here is a utility to display a slower, more organized directory listing, good for those who find it difficult to keep up with `DIR`'s fast scroll-through. It handles up to 72 files.

```
0 CLS:CLEAR2000:K=0:M=1:FORA=3TO
11:DSKI$ 0,17,A,B$,C$:D$=B$+LEFT
$(C$,127):E$(0)=LEFT$(D$,8):FOR
F=1TO7:E$(F)=MID$(D$,F*32+1,8):N
EXTF:FOR G=0TO7:PRINT@K,"#";M")"
E$(G):K=K+16:M=M+1:IF K>500THEN
K=480
1 EXEC44539:NEXTG:NEXTA:END
```

John M. Beck
Suitland, Maryland

☞ This short program converts fractions to their decimal counterparts.

```
1 CLS:PRINT:PRINT"  NUMERATOR":P
RINT"———————":PRINT"DENOMINATOR":P
RINT:INPUT"INPUT NUMERATOR  ";A:
PRINT"                       --":INPU
T"INPUT DENOMINATOR";B:D=(1/B)*A
:PRINT@330,A;"/";B;"=";:PRINTUSI
NG".#####";D
```

Charles A. Kiedaisch
Mokena, Illinois

☞ This shows how you can scale a `DRAW` command string. It draws a number of airplanes that are all the same shape, but some are large and some are small.

```
1 PMODE4,1:PCLS:SCREEN1,1:FORT=8
TO170STEP15:L$="S"+STR$(RND(5)+1
)+"BM"+STR$(RND(170)+10)+","+STR
$(T)+"R9U3R6D6G3L15D1F2G2H2E2U1L
3H3D3U6D3E3D3R8L8U3R8U3L8R2D2":D
```

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As an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

If you missed the fun at our last RAINBOWfest in Somerset, New Jersey, why don't you make plans now to join us in Chicago? For members of the family who don't share your affinity with the CoCo, there are many other attractions in the Chicago area.

The Hyatt Regency Woodfield—Schaumburg, Illinois, offers special rates for RAINBOWfest.

The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — The CoCo Community Breakfast (separate ticket required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 3 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get the special room rate.

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```
RAW L$:NEXT T:FORP=1TO900000:FOR
O=1TO900000:NEXTO:NEXTP
```

Bryan Copeland
Keithville, Louisiana

☞ This program will turn your CoCo into an alarm system to guard against any little "door-slammer" who may want to bang on those keys if you have to leave the room. Just turn up the TV volume and wait.

```
10 A$=INKEY$:IFA$=""THEN10ELSEFO
RX=1TO5:Y=RND(8):CLSY:SOUND150,8
:PRINT@224,"DO NOT TOUCH THOSE K
EYS AGAIN !!":FORT=1TO100:NEXT:S
OUND180,8:FORT=1TO100:NEXTT,X:CL
S:GOTO10
```

Tom McCarthy
Sterling, Virginia

☞ This one-liner for disk users automatically saves a program on disk before running it, if you enter the `RUN` command in a special way:

```
RUN'TEST
```

If you add the apostrophe and a filename, this line will see the apostrophe, read in the filename and save the program with that name.

```
10 CLS:CLEAR200:IFPEEK(734)=131T
HENPOKE749,0:FORT=735TO749:IFPEE
K(T)<>0THENA$=A$+CHR$(PEEK(T)):N
EXTELSEPRINT@256,"SAVING PROGRAM
":PRINT"NAME: "A$:POKE65494,0:VE
RIFYON:SAVEA$:VERIFYOFF:POKE6534
4,0:FORT=1TO300:NEXT:POKE734,0:R
UN
```

Victor Capton
Troy, Michigan

☞ This one-liner displays all the numbers from zero to 255 with their hexadecimal and binary equivalents.

```
1 PMODE4,1:PCLS:G=PEEK(186)*256+
PEEK(187):FORN=0TO255:POKEG,N:PR
INTN"  "HEX$(N)"   ";:FORX=0TO7:
IFPPOINT(X,0)THENPRINT"1";:IFX=7
THENNEXT:PRINT:NEXT:ELSENEXT:ELS
EPRINT"0";:IFX=7THENNEXT:PRINT:N
EXT:ELSENEXT
```

Todd Knudsen
Sandy, Utah

☞ This educational one-liner asks you to solve ten multiplication problems. When you have finished, it tells you how many seconds it took you to solve them.

```
0 CLS:PRINT"TIMED MULTIPLICATION
 QUIZ":INPUT"ENTER TO BEGIN";A$:
TIMER=0:FORZ=1TO10:A=RND(12):B=R
ND(12):PRINTA"*"B;:INPUTC:IFC<>A
*B THENPRINT"WRONG CORRECT ANSWE
R IS";A*B:Z=Z-1:NEXT:ELSEPRINT"C
ORRECT":NEXT:PRINT"IT TOOK YOU"T
IMER/60"SEC. FOR 10 QUES."
```

Robert Davis
Dallas, Oregon

☞ *Times* simply displays a standard multiplication table.

```
10 CLS:PRINT@10,"TIMES TABLES":P
RINT:FORX=1TO10:PRINTX;:NEXT:FOR
X=2TO10:FORY=1TO10:P$=MID$(STR$(
X*Y),2):PRINT@30+32*X+3*Y,P$:NEX
T:NEXT:EXEC44539
```

Leonard Dalenberg
Virginia Beach, Virginia

☞ This program finds "palindrome squares," which are integers that when squared produce numerical palindromes.

```
1 N=N+1:S$=STR$(N*N):T$=RIGHT$(S
$,LEN(S$)-1):FORX=1TOINT(LEN(T$)
/2):IFRIGHT$(LEFT$(T$,X),1)<>LEF
T$(RIGHT$(T$,X),1)THEN1ELSENEXT:
PRINTN"SQUARED ="N*N:GOTO1
```

Stanley Townsend
Alturas, California

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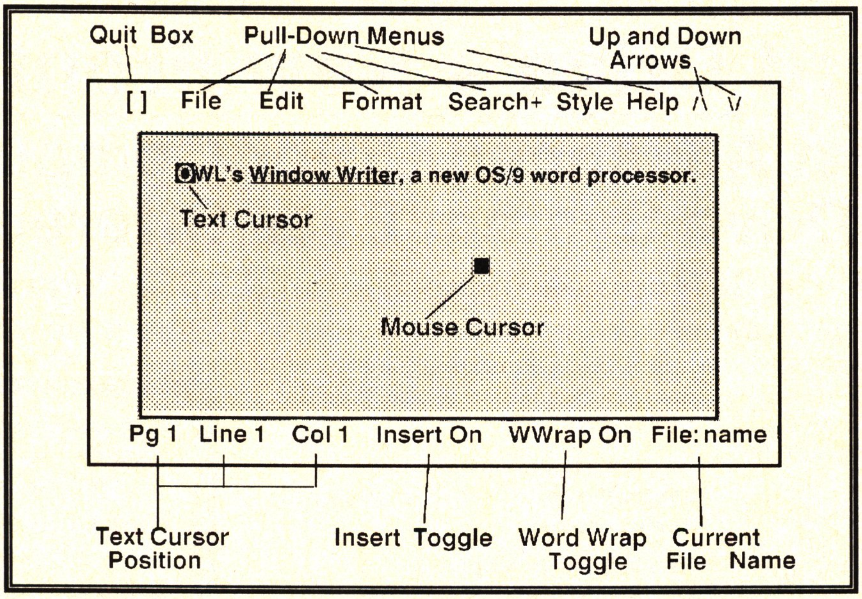

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Multi-Tasks

Window Writer is the first Color Computer word processor which takes full advantage of OS/9. The result is a word processor which is fully as modern and professional in action as those previously available only for the IBM and Mac. The operating system allows true multi-tasking with other programs or itself. Not limited to just printing one file and editing another. You can print one file in one window while you edit files in other windows. At the same time you can be running a small program in another window. You can cut and paste between sections of files in different windows.

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A full selection of pull down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. All menus and help screens can be user configured for everything including menu colors and contents. You don't like the color of a menu? You think one help item should be listed differently? Change them!

The menus and help screens can be reached by cursor keys or the mouse (or joystick) or can be accessed by control keys.

Hi-Res Display

Window Writer uses an **80-column monitor display** screen for clarity. As shown in the above screen drawing, you can quickly see how to access the menus and help screens. You can determine the current position by page, line number, and column. The mouse can use this section to quickly change to a specific page or line in the file. The text insert and word wrap toggles also are indicated and changeable with the mouse button.

Ram Disk

A RAM disk is set up in **Window Writer** to make full use of all or a user specified portion of the memory on the 512K CoCo 3. On the 128K CoCo a smaller RAM disk is set up to still allow use of all available memory for file editing. For use of all features, a 512K machine is required.

The RAM disk is used for storage of the file(s) being edited, for the clipboard for cut and paste, and as a print spooler for the file being printed. **Window Writer's** clipboard can be saved to disk or pasted into any file being edited because files use the same clipboard memory. The RAM disk also can be used with other OS/9 programs.

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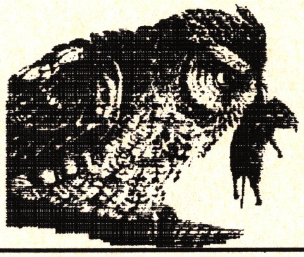
With **Window Writer** you can create form letters and send them out to a list of addresses in an address file. First names or other information can be added to "personalize" these letters.



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An abridged French translation of the **Window Writer** manual is now available. This manual is written by a Canadian CoCo user and will aid French speaking users. **Only $7.50 additional.**

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Editing

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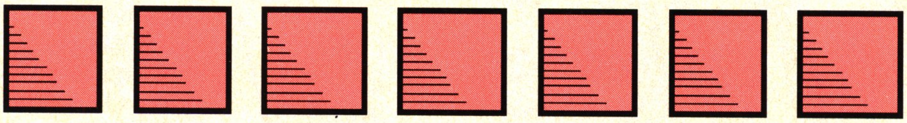
Running against the clock and away from deadly skulls

One Tile at a Time



by Nick Bradbury

T*he Frustrator* is a game for the CoCo 3 that combines the strategy of thinking games with the fast action and graphics of arcade games. The game is played on a seven-by-seven grid, and your task is to fill the grid with tiles before your time runs out.

On the first few levels of the game, this is a relatively simple task to complete. However, more and more obstacles will hinder you as the game progresses. You see, the computer tends to cheat a little by removing some of the tiles every now and then. Also, the computer attempts to block you by placing skulls in your path. If you hit one of these skulls, the game is immediately ended.

Game Play

When the game begins, you are asked to select the level of difficulty. First-time players should begin at Level 1 to get used to the joystick control and game play, but experienced players can begin at Level 4 or higher for a greater challenge. Although you may only begin at levels 1 through 9, there are many levels beyond these. It is unlikely that many players will get beyond Level 14 or 15. *[Editor's Note: This sounds like a direct challenge if you ask us.]*

The right joystick controls the gray *x* and *y* markers on the screen. This takes some getting used to, so you may want to play a few practice games first. Pressing the red button on the right joystick places a tile in the square corresponding to your markers. You must place a tile in every open square on the grid to advance to the next level of play. The first three levels are relatively simple because you are only required to place one (red) tile in each square, but every level beyond three requires two tiles (first a purple, then a red) in each square, which makes the game much more challenging.

Your opponent in *The Frustrator* is none other than your once friendly CoCo, which attempts to stop you from completing the grid. The first and most frustrating way it does this is by occasionally removing tiles you have placed. Another way the computer tries to hinder you is by placing skulls in your path. If you try to place a tile on a skull, your game is finished. Any skull placed on the grid remains until the end of the level. Points are awarded for every skull remaining on the grid when you have completed the level.

Plus and minus signs are also randomly placed on the grid. Plus signs add points to your score while minus signs take points away. Your timer can be increased by picking up a square occupied by a large T that also appears at random.

Flashing question marks are best avoided; when selected, these question marks alter the way your joystick controls tile placement. There are three variations in joystick control:

(1) Single touch
(2) Release and press
(3) Continuous

When you are asked to choose your starting level at the beginning of the game, you can press V to select a different joystick variance to begin the game. After every third level you enter a bonus round during which you can earn extra points. Strange "eyeball" creatures appear and disappear in the grid. To earn bonus points,

Table 1: Important Variables

`SC` - score
`TM` - timer
`RN` - level #
`ZT` - # tiles placed
`ZP` - # tiles possible
`X,Y` - *x* and *y* positions of player's markers
`T1` - counter for timer
`VA` - joystick variation (1-3)
`BO` - 0=regular level, 1=bonus level
`X1,Y1` - *x* and *y* positions to place objects
`SK` - # skulls on screen
`SE` - # eyeball creatures hit on bonus level
`C0(I)` - palette colors (I=Palette Register #1)
`C1(I)` and `C2(I)` - tile and background colors (I=level #)

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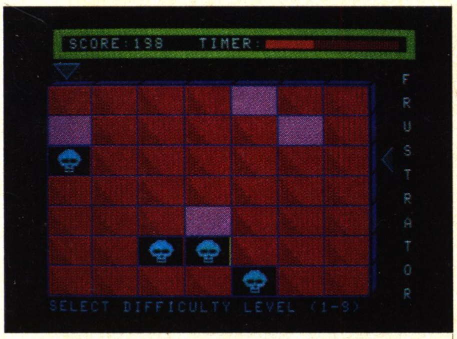
you must act as though you are placing a tile on a square occupied by one of these creatures. All points are awarded at the end of the bonus round, at which time your timer is reset.


SCORE:198 TIMER:
FRUSTRATOR
SELECT DIFFICULTY LEVEL (1-9)

The Frustrator becomes progressively harder after each level. The computer starts to remove tiles and place skulls at a much faster pace, and during the bonus levels the creatures disappear much quicker. Also, the timer ticks away faster as each level progresses.

Scoring is as follows:

Plus sign — +5 x level of play
Minus sign — -5 x level of play
Skulls — 2 points at end of level
T — 10 timer units (start with 50)
Eyeball creatures — 5 points each
Completing level — 10 x level of play

Running the Game

Note that a `POKE 65497,0` is executed in Line 0 to put the computer into the high-speed mode. Make sure the computer is in the normal-speed mode before accessing the disk or cassette in any way. To do this, type `POKE 65496,0` and press ENTER. The listing is rather lengthy, so save several copies while entering it.

Table 1 is a list of the most important variables used in the program. I have provided this so people who like to experiment will have an easier time doing so.

The graphics in *The Frustrator* are relatively simple to create. All objects, including the tiles themselves, were saved using `HGET` commands so they can quickly and easily be placed on the screen (using `HPUT`). Table 2 contains a list of the various objects and their corresponding `HGET/HPUT` buffer numbers. For further information on the use of these commands, please refer to the CoCo 3 Extended BASIC manual.

A simple technique was used to create the flashing effect of the skulls. The background color behind the skulls is the color contained in Palette Register 6. By simply placing a random number into Palette 6 every few seconds, the program makes the background appear to flash. For a simple demonstration of this effect, enter this short listing:

```
5 CMP:ON BRK GOTO 50
10 HSCREEN:HCLS 8:HCOLOR 6
20 HLINE(10,10)-(90,90),PSET,BF
30 PALETTE 6, RND(63)
40 GOTO 30
50 CMP:HSCREEN0:WIDTH32:END
```

Table 2: HGET/HPUT buffer numbers

1. Blank #1
2. Plus sign
3. Minus sign
4. Blank #2
5. Player's X marker
6. Blank #3
7. Y marker
8. Skull
9. Big T
10. Blank #4
11. Blank #5
12. Eyebal creature
13. Unused
14. Red tile
15. Violet tile
16. Big '?'
17. Blank tile

Note to RGB users: The listing presented here is for CoCo owners who are using a television set or composite monitor as a display. If you are using an RGB monitor, enter the listing as it appears and make the following changes:

```
770 DATA 18,54,9,36,63,27,45,38,
0,57,7,5,47,8,4,23
780 DATA 9,54,9,54,47,5,56,63,1,
8,54,9,53,54,58,18,63,9
```

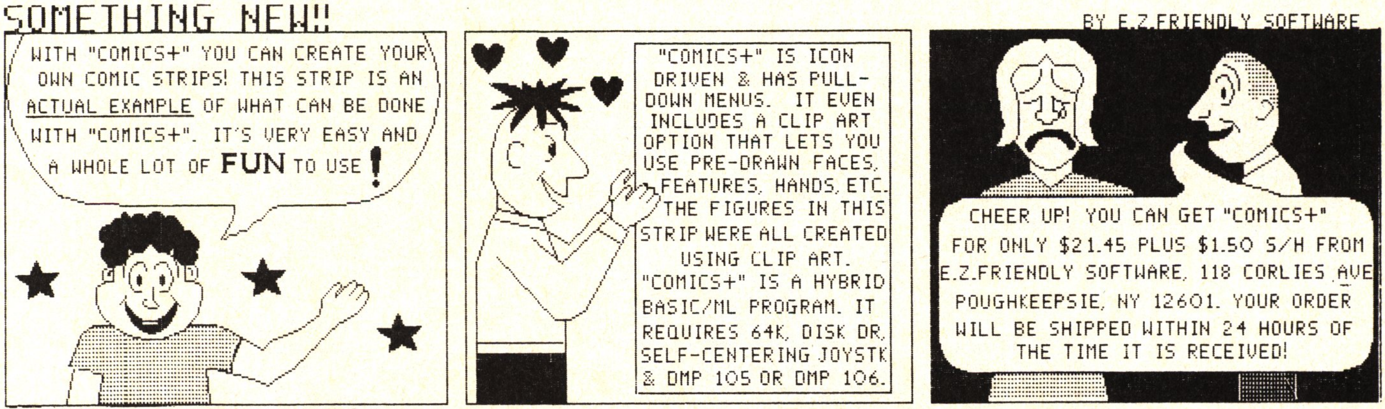
❑

CoCo 3

80	68
120	54
200	3
310	147
390	85
480	223
590	226
640	162
700	197
750	35
800	136
890	194
970	44
1060	73
1100	177
1160	196
1200	53
1260	191
1320	138
END	183

The listing: FRUSTRAT

```
0 CLEAR1500:FORI=0TO15:PALETTEI,
0:NEXTI:HBUFF1,310:HBUFF2,310:HB
UFF3,310:HBUFF4,420:HBUFF5,420:P
OKE65497,0:TIMER=RND(1000):DIMLN
$(99),C0(15),C1(22),C2(22)
1 'COPYRIGHT 1989, FALSOFT INC.
10 HBUFF6,100:HBUFF7,100:HBUFF8,
576:HBUFF9,270:HBUFF10,270:HBUFF
```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```
11,928:HBUFF12,928:HBUFF13,576:H
BUFF14,576:HBUFF15,576:HBUFF16,1
80:HBUFF17,680
20 ON BRK GOTO1350
30 PLAY"O3V31L255T255":HSCREEN2:
GOSUB930
40 HCOLOR0:HLINE(28,1)-(298,21),
PSET,B:HLINE(34,5)-(292,17),PSET
,B:HPAINT(30,2),15,0
50 GOSUB1140
60 SC=0:TM=50:RN=1
70 GOSUB800:GOSUB1280
80 HCOLOR1:FORX=27TO260STEP34:HL
INE(X+2,37)-(X+32,37),PSET:HLINE
(X,38)-(X+30,38),PSET:NEXT:FORY=
40TO176STEP20:HLINE(265,Y-1)-(26
5,Y+16),PSET:HLINE(266,Y-2)-(266
,Y+14),PSET:HLINE(264,Y)-(264,Y+
17),PSET:NEXT
90 X=40:Y=50:GOSUB760
100 HCOLOR4:HPRINT(5,1),"SCORE:"
:GOSUB460:HPRINT(17,1),"TIMER:":
GOSUB1220
110 HCOLOR5:PLAY"V31":HLINE(5,18
4)-(150,192),PRESET,BF:IFBO<>1TH
ENHPRINT(3,24),"LEVEL":HPRINT(9,
24),LN$(RN):PALETTE5,C0(5) ELSEH
PRINT(3,24),"BONUS ROUND":PALETT
E5,C0(5):PLAY"O3DFDFDFDFFDFDFDFD
FDFDF"
120 PALETTE6,RND(30)-1:J0=JOYSTK
(0):J1=JOYSTK(1):IFZT>=ZP THEN48
0ELSEIFBO=0ANDTM<10THENPALETTE7,
0
130 IFBO=0ANDTM<10THENPALETTE7,0
140 XX=X:YY=Y:IFJ0<15THENM=1:X=X
-34ELSEIFJ0>48THENM=1:X=X+34
150 IFJ1<15THENMM=2:Y=Y-20ELSEIF
J1>48THENMM=2:Y=Y+20
160 IFX<40THENX=40ELSEIFX>244THE
NX=244
170 IFY<50THENY=50ELSEIFY>170THE
NY=170
180 IFM=1THENHPUT(XX-12,25)-(XX+
16,36),4,PSET:M=0
190 IFMM=2THENHPUT(270,YY-10)-(2
78,YY+7),6,PSET:MM=0
200 HPUT(X-12,25)-(X+16,36),5,PS
ET:HPUT(270,Y-10)-(278,Y+7),7,PS
ET:IFBO=0ANDTM<10THENPALETTE7,38
210 IFBO=1THEN710ELSET1=T1+1:IFT
1>15-TV THENT1=0:GOSUB470
220 IFBO=1THENGOSUB660:GOTO240
230 IFRN>13THENGOSUB530ELSEIFRND
(14-RN)=1THENGOSUB530
240 IFVA=2THEN250ELSEBT=0
250 IFVA=3THENGOSUB290ELSEIFBUTT
ON(0)=1THENGOSUB290ELSEBT=0
260 IFG1>0THENG1=G1+1:IFG1>50THE
NGOSUB620
270 I$=INKEY$:IFI$="R"THEN1340
280 GOTO120
290 IFBT=1THENRETURNELSEBT=1:X1=
X-16:Y1=Y:P=HPOINT(X,Y)
300 IFBO=1THEN700ELSEIFG1<1THEN3
10ELSEIF((X1-1)=(X2-10) AND (Y1-
10)=(Y2-4)) THEN380
310 IFP=2THENHCOLOR12 ELSEIFP=12
THENHCOLOR3
320 IFP=3THEN360ELSEIFP=10THEN37
0
330 IFRN<4THENHCOLOR3
340 ZT=ZT+1:IFRN<4 ORP=12THENHPU
T(X1,Y1-10)-(X1+33,Y1+10),14,PSE
T ELSEHPUT(X1,Y1-9)-(X1+32,Y1+9)
,15,PSET
350 PLAY"O2DO3C"
360 RETURN
370 PLAY"O1":FORV=30TO1STEP-3:PL
AY"V"+STR$(V)+"AEC":PALETTE8,RND
(63):NEXTV:GOTO1340
380 IFG5=1THEN430ELSEIFG4=1THENP
LAY"O3CDEFGABO4CD":SC=SC+(5*RN):
GOSUB460:GOSUB620:RETURN ELSEIFG
3=1THEN410 ELSEIFG2=1THEN390IFG2
=1THEN390ELSEIFG3=1THEN410
390 G2=0:SC=SC-(5*RN):PLAY"O4DCO
3BAGFEDC":IFSC<0THENSC=0
400 GOSUB460:GOSUB620:RETURN
410 T=TM:TM=TM+10:IFTM>50THENTM=
50
420 HCOLOR7:FORI=185+(T*2) TO185
+(TM*2):HLINE(I,9)-(I,14),PSET:P
LAY"O4AO1C":NEXT:GOSUB620:RETURN
430 PLAY"O4CDEFGFEDC":GOSUB620
440 I=RND(3):IFI=VA THEN440ELSEV
A=I
450 RETURN
460 HCOLOR4,8:HLINE(88,8)-(120,1
6),PRESET,BF:HPRINT(10,1),SC:RET
URN
470 T=185+TM*2:HLINE(T,9)-(T,14)
,PRESET:PLAY"O2F":TM=TM-1:IFTM>0
THENRETURNELSEPLAY"O4":FORI=1TO1
8:PLAY"CE":PALETTE7,RND(63):NEXT
I:IFBO=1THEN730ELSEGOTO1340
480 IFBO=1THENBO=0:GOTO500ELSEIF
RN/3<>INT(RN/3) THEN500
490 BO=1
500 FORI=30TO5STEP-2:PALETTE3,63
:PLAY"V"+STR$(I)+"O4GFED":PALETT
E3,7:PLAY"O5CFEFE":NEXTI:RN=RN+1
:SC=SC+(RN*10)+(SK*2):GOSUB460
510 GOSUB1140:GOSUB410:IFBO=1THE
NXE=161:YE=81:HGET(XE,YE)-(XE+29
,YE+18),11
520 G1=0:G2=0:G3=0:G4=0:GOTO110
530 X1=6+RND(7)*34:Y1=21+RND(7)*
20:P=HPOINT(X1,Y1):IFRND(ABS(15-
RN))=1THEN640
540 IFP=12THENHCOLOR2 ELSEIFP=3T
HENHCOLOR12 ELSEIFP=2THEN580ELSE
RETURN
550 IFRN<4THENHCOLOR2
560 ZT=ZT-1:IFRN<4ORP=12THENHPUT
(X1-16,Y1-1)-(X1+17,Y1+19),17,PS
ET ELSEHPUT(X1-15,Y1)-(X1+17,Y1+
18),15,PSET
570 PLAY"O2FEFO1EFF":RETURN
580 IFG1>0THEN620ELSEG1=1
590 X2=X1-7:Y2=Y1+3:IFRND(3)=1TH
ENG2=1:HPUT(X2,Y2)-(X2+22,Y2+12)
,3:RETURN
600 IFRND(2)=1THENG5=1:G2=0:HPUT
(X2,Y2-2)-(X2+12,Y2+13),16,PSET:
RETURN
610 IFRND(4)=1THENG3=1:G2=0:HPUT
(X2,Y2-2)-(X2+18,Y2+13),9,PSET:R
ETURN ELSEHPUT(X2,Y2)-(X2+22,Y2+
12),2,PSET:G4=1:RETURN
620 G4=0:G2=0:G1=0:HPUT(X2,Y2)-(
X2+22,Y2+12),1,PSET:IFG3<>1ANDG5
<>1THENRETURNELSEHPUT(X2,Y2-2)-(
X2+18,Y2+13),10,PSET:G3=0:G5=0:R
ETURN
630 RETURN
640 IFP=6THENRETURNELSESK=SK+1:X
1=X1-16:HPUT(X1,Y1)-(X1+31,Y1+18
),8,PSET:PLAY"O1DEFO2DEFO1CDE":I
FP=3THENRETURNELSEZT=ZT+1:IFRN>3
ANDP=2THENZT=ZT+1
650 RETURN
660 T9=T9+1:IFT9<16-RN THENRETUR
N
670 HPUT(XE,YE)-(XE+29,YE+18),11
,PSET
680 XE=RND(7)*34:YE=RND(7)*20:XE
=XE-9:YE=YE+21:HGET(XE,YE)-(XE+2
9,YE+18),11:HPUT(XE,YE)-(XE+29,Y
E+18),12,PSET:PLAY"O2EAO1A":T9=0
690 RETURN
700 IFP<>13THENRETURNELSEHPUT(XE
,YE)-(XE+29,YE+18),11,PSET:SE=SE
+1:D$="O5CDEFG":FORV=30TO5STEP-8
:PLAY"V"+STR$(V)+D$:NEXTV:PLAY"V
31":GOTO680
710 T1=T1+1:IFT1>2THENT1=0:GOSUB
470
720 GOTO220
730 SC=SC+5*SE:GOSUB460:SE=0:FOR
I=1TO4:PLAY"O"+STR$(I)+"CDEFGAB"
:NEXTI
740 PALETTE7,38:BO=2:HPUT(XE,YE)
-(XE+29,YE+18),11:T=TM:TM=50:GOS
UB420:GOSUB1140:GOTO110
750 'SET UP PALETTE
760 PALETTE5,60:FORI=0TO15:READC
0(I):PALETTEI,C0(I):NEXT:FORI=0T
O8:READC2(I),C1(I):NEXT:FORI=1TO
25:READLN$(I):NEXT:FORI=26TO99:L
N$(I)=STR$(I):NEXT:RETURN
770 DATA 18,36,11,7,63,48,9,38,0
,32,16,9,25,13,4,47
780 DATA 11,36,11,36,41,9,32,63,
17,36,36,11,20,36,49,17,63,11
790 DATA ONE,TWO,THREE,FOUR,FIVE
,SIX,SEVEN,EIGHT,NINE,TEN,ELEVEN
,TWELVE,THIRTEEN,FOURTEEN,FIFTEE
N,SIXTEEN,SEVENTEEN,EIGHTEEN,NIN
ETEEN,TWENTY,TWENTY-ONE,TWENTY-T
WO,TWENTY-THREE,TWENTY-FOUR,TWEN
TY-FIVE,26,27,28,29,30,31,32,33,
34,35
800 HGET(33,44)-(55,56),1:D1$="R
2U2R2D2R2D2L2D2L2U2L2U2
810 HCOLOR12:HDRAW"BM33,48;S9;XD
1$;":HPAINT(38,49),11,12
820 HGET(33,44)-(55,56),2:HPUT(3
3,44)-(55,56),1,PSET
830 D2$="R6D2L6U2":HCOLOR3:HDRAW
"BM33,48;S9;XD2$;":HPAINT(35,50)
,14,3
840 HGET(33,44)-(55,56),3
850 HPUT(33,44)-(55,56),1,PSET
860 HGET(28,28)-(56,39),4:HCOLOR
9,8:D3$="R4G2H2":HDRAW"BM28,28;S
20;XD3$;":HPAINT(40,30),10,9
870 HGET(28,28)-(56,39),5:HPUT(2
8,28)-(56,39),4,PSET
880 HGET(267,61)-(275,78),6:D4$=
"BR2D4H2E2":HDRAW"BM267,61;S18;X
D4$;":HPAINT(275,74),10,9
890 HGET(267,61)-(275,78),7:HLIN
E(267,60)-(278,79),PRESET,BF
900 HGET(30,43)-(48,58),10:HCOLO
R4:D5$="R6D2L2D3L2U3L2U2":HDRAW"
BM30,43;S12;XD5$;":HPAINT(34,45)
,0,4
910 HGET(30,43)-(48,58),9:HPUT(3
0,43)-(48,58),10,PSET
920 RETURN
930 HCLS6:HCOLOR9:HCIRCLE(128,96
),9,,.8:HPAINT(128,96),5,9
940 HLINE(125,100)-(131,104),PSE
T,B
950 HCOLOR10:HCIRCLE(125,97),3,,
.9:HCIRCLE(131,97),3,,.9:HPAINT(
125,97),8,10:HPAINT(131,97),8,10
960 HLINE(128,100)-(129,101),PSE
T,B
970 HGET(112,88)-(143,106),8:HCL
```

```
S8
980 HCOLOR1:HCLS8:HGET(113,88)-(
142,106),11
990 HCOLOR10:HCIRCLE(128,96),9
1000 HCIRCLE(128,100),9,,1,.50,0
1010 HPAINT(128,100),4,10:HPAINT
(128,91),9,10
1020 HCIRCLE(128,95),4,13,1.2:HP
AINT(128,95),13,13:HSET(129,93,8
):HSET(131,93,8):HSET(130,93,4)
1030 HCOLOR3:HLINE(122,99)-(114,
104),PSET:HLINE(123,101)-(115,10
6),PSET:HLINE(124,103)-(116,109)
,PSET
1040 HLINE(134,99)-(142,104),PSE
T:HLINE(133,101)-(141,106),PSET:
HLINE(132,103)-(140,108),PSET
1050 HGET(113,88)-(142,106),12:H
CLS8
1060 HCOLOR3:HLINE(24,41)-(58,59
),PSET,BF:FORI=43TO59STEP2:HSET(
26,I,8):NEXTI:FORI=46TO59STEP2:H
SET(28,I,8):NEXTI:FORI=49TO59STE
P2:HSET(30,I,8):NEXT:FORI=51TO59
STEP2:HSET(32,I,8):NEXT:FORI=54T
O59STEP2:HSET(34,I,8):NEXT
1070 FORI=54TO59STEP2:HSET(36,I,
8):NEXT:HSET(38,57,8):HSET(38,59
,8):HSET(40,59,8)
1080 HCOLOR1:HLINE(23,40)-(57,60
),PSET,B:HGET(24,40)-(57,60),14
1090 HCOLOR12:HLINE(24,41)-(58,5
9),PSET,BF:HCOLOR1:HLINE(23,40)-
(57,60),PSET,B:HGET(24,41)-(56,5
9),15
1100 HCLS2:D$="U1E1R1F1D1G2D1BD1
D1":HCOLOR6:FORI=128TO132:HDRAW"
BM"+STR$(I)+",96;S8;XD$;":NEXTI:
HDRAW"BM132,96;C8;XD$;":HGET(126
,91)-(138,106),16
1110 HCLS2:HCOLOR1:HLINE(23,40)-
(57,60),PSET,B::HGET(24,40)-(57,
60),17
1120 HCLS8
1130 RETURN
1140 FORI=1TO3:PALETTEI,0:NEXTI:
FORI=8TO14:PALETTEI,0:NEXTI:PALE
TTE5,0:PALETTE6,0:R=RN:TV=R:II=0
:HCOLOR2,8:SK=0:ZT=0:IFRN<4THENZ
P=49ELSEZP=98:IFTV>10THENTV=10
1150 IFR>8THENR=R-8:GOTO1150
1160 IFBO=2THENBO=0:GOTO1180ELSE
FORIX=23TO250STEP34:FORIY=40TO17
0STEP20:HPUT(IX+1,IY)-(IX+33,IY+
20),17,PSET:NEXTIY,IX1170
HCOLOR1:HLINE(23,40)-(23,18
0),PSET:HGET(24,41)-(56,59),13
1180 A$="FRUSTRATOR":A=36:IFBO=1
THENPALETTE1,23:PALETTE2,7ELSEPA
LETTE1,C1(R):PALETTE2,C2(R)
1190 HCOLOR4:L=LEN(A$):FORI=1TOL
:HPRINT(A,I*2+2),MID$(A$,I,1):NE
XT
1200 PALETTE3,C0(3):PALETTE4,C0(
4):FORI=6TO14:PALETTEI,C0(I):NEX
T
1210 RETURN
1220 I$=INKEY$:PLAY"V5":HCOLOR9:
HLINE(0,184)-(150,192),PRESET,BF
:HPRINT(3,24),"SELECT DIFFICULTY
 LEVEL (1-9) ":VA=1
1230 GOSUB1320:I$=INKEY$:IFI$="V
"THEN1290ELSEV=VAL(I$):GOSUB1330
:IFV<1ORV>9THEN1230ELSERN=V:R=RN
1240 IFR>8THENR=R-8:GOTO1240
1250 TV=RN:PLAY"V31":PALETTE1,C1
(R):PALETTE2,C2(R):HCOLOR4,8:HLI
NE(0,184)-(284,192),PRESET,BF
1260 IFRN<4THENZP=49ELSEZP=98
1270 RETURN
1280 HCOLOR7:FORI=185TO185+(TM*2
):HLINE(I,9)-(I,14),PSET:NEXT:RE
TURN
1290 WIDTH32:PALETTE12,63:PRINT@
136,"SELECT VARIATION:":PRINT@19
8,"(1) SINGLE TOUCH":PRINT@230,"
(2) RELEASE AND PRESS":PRINT@262
,"(3) CONTINUOUS":
1300 V=VAL(INKEY$):IFV<1ORV>3THE
N1300
1310 VA=V:POKE&HE6C6,33:HSCREEN2
:POKE&HE6C6,141:PALETTE12,C0(12)
:GOTO1230
1320 FORI=5TO3STEP-1:PLAY"O"+STR
$(I):FORII=12TO1STEP-1:PLAYSTR$(
II):NEXTII,I:RETURN
1330 FORI=1TO3:PLAY"O"+STR$(I):F
ORII=1TO12:PLAYSTR$(II):NEXTII,I
:RETURN
1340 PALETTE8,0:SC=0:TM=50:GOSUB
1220:GOSUB460:GOSUB1280:GOTO510
1350 POKE65496,0:HSCREEN0:CMP:EN
D
1360 PRINT@320,B:INPUTA:B=B+A:GO
TO1360
```

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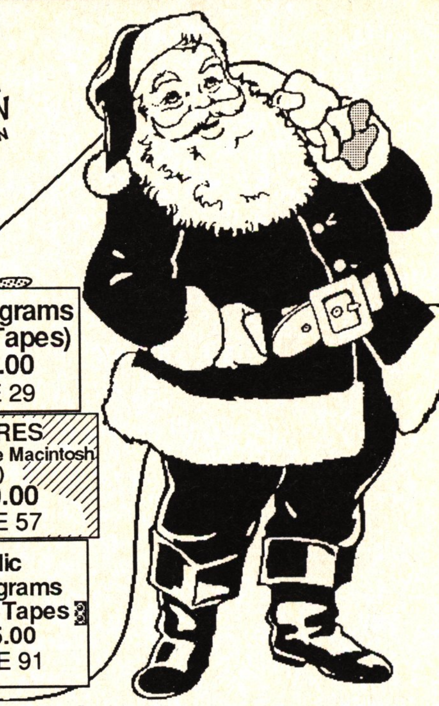

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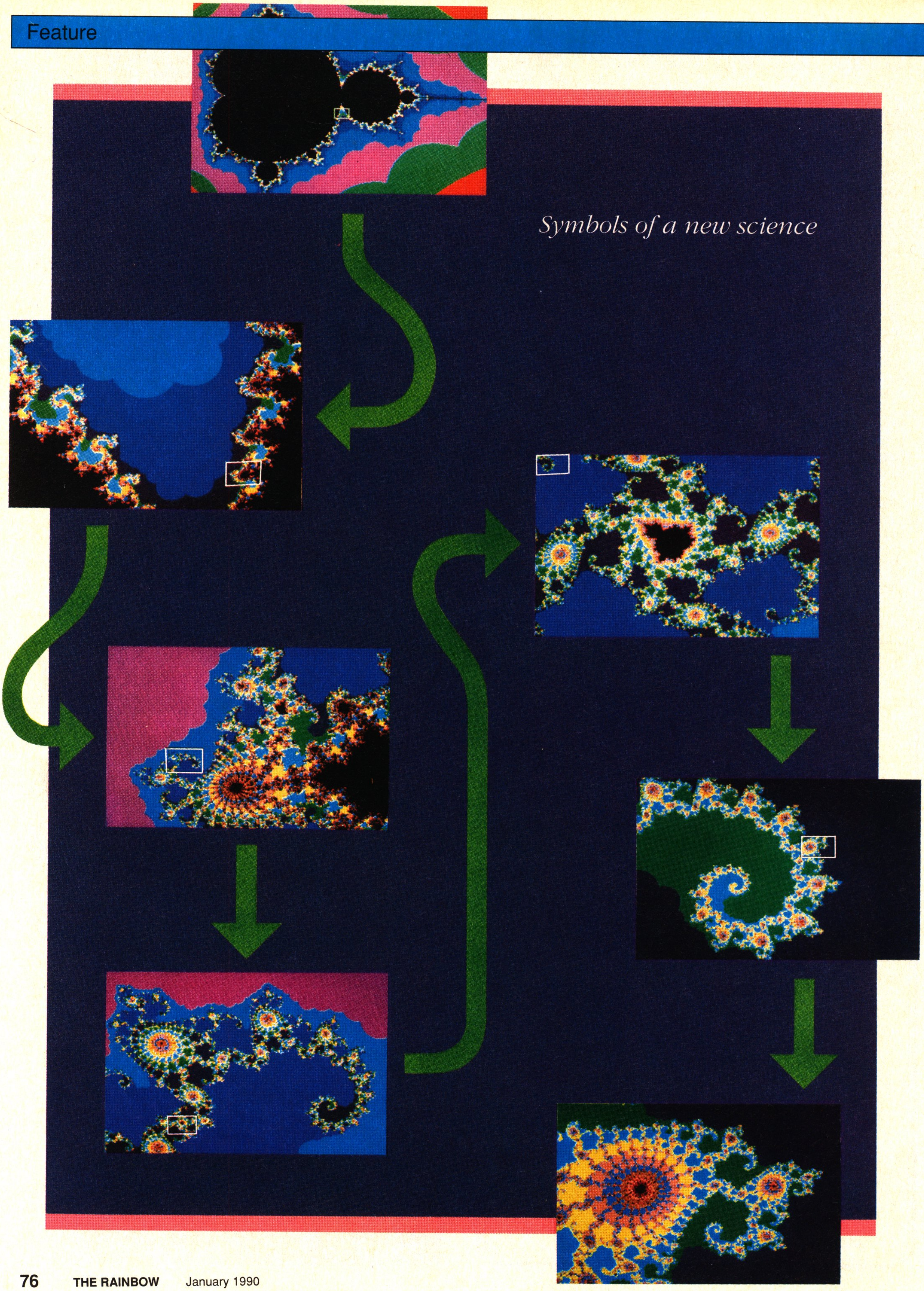

Symbols of a new science

The Mandelbrot Bug and the CoCo 3 Microscope

by Jeremy and Marty Spiller

You and your CoCo 3 can become explorers in a new and largely uncharted landscape discovered in 1979 by Benoit Mandelbrot, an American mathematician. The Mandelbrot set has become the symbol of a new science — a science of chaos that has cut across all the scientific subdisciplines and revolutionized them. This program, *The Mandelbrot Bug and the CoCo 3 Microscope*, lets your computer loose in Mandelbrot's world.

Before I explain the how and why of the program, let me say that this is not a program for anyone looking for instant results. A screen can take from 12 hours to four days to complete, depending on the area you want to enlarge and the number of iterations you specify. You may, however, break construction whenever you need the machine for other purposes. The program provides an easy method for saving and reloading unfinished screens so they may be completed at a later time. Of course you can save completed screens as well. You can also build a screen on three or four successive nights while using the computer for other projects during the day. This program works only on the CoCo 3.

Tape Versus Disk

The program was originally written for use with a disk drive. While the screens can be saved to tape, the sheer length of a screen save makes a disk drive more practical. Tape users need to make the following modifications while keying in the program: Delete lines 200, 250 and 260; change the `>4` in Line 210 to `>3`; change the `SAVEM` in lines 1280 through 1310 to `CSAVEM`; and change the `LOADM` in lines 1370 through 1400 to `CLOADM`.

The Mandelbrot Bug

The Mandelbrot bug is a mathematical monster that lives in a land called the *complex plane*. It exists in a two-dimensional world where it can comprehend only two directions of movement. It can go up and down or to the right or left. If it goes up or down, it is traveling in the direction of imaginary numbers. If it goes right or left, it is traveling in the direction of real numbers. Since you and I live in a three-dimensional world, we are privileged to look at it from a vantage point that it could never imagine — from outside the TV screen.

While its world is very different from ours, at least one thing is the same: We can view our world from far away or from close up. The Mandlebrot bug can do the same with its world. If I look at my computer from far away, I can see the whole keyboard, but I may be too far away to read the letters on it. If I move closer, say one foot away, I can see the keys clearly. If I get out a magnifying glass, I can see flaws and scratches in the plastic. I can use a microscope to see that the letters on the keys actually have irregular borders, and an electron microscope would show an irregular universe of molecular mountains and valleys. Each time we get closer, we are seeing the object on a different *scale*. The Mandelbrot bug's world is infinite in both area and scale. We can examine to infinity in both real and imaginary directions, or we can zero in on one tiny area, magnifying areas within it again and again down to scales smaller than an electron. We can do this because the bug lives in a mathematical world, and we have our CoCo 3's, which can be programmed to act like microscopes. When we use *CoCo 3 Microscope*, we find infinitesimal Mandelbrot bugs, fingers of fire, oceans of color, microscopic seahorse tails, intricate filigree and geometric designs. You can spend all of eternity exploring a tiny area of Mandelbrot's complex plane and never see exactly the same thing twice!

How to Run It

The program allows you to explore a box that measures four inches square, centered on zero in both real and imaginary axes. At first glance this may sound limiting, considering that the complex plane is infinite in area. However, since any part of the box can be examined in microscopic detail, even a lifetime would not be enough to completely explore it. For those intrepid enough to explore beyond these ranges, you can modify Line 510 to create another 4-by-4 box some place in the complex plane. The main menu allows several options, including running a directory for the disk in Drive 0, without breaking the program. Tape users should delete all references to Disk BASIC as described above. The main menu also allows you to load a previously saved picture or begin a new picture from scratch. Press 2 at the startup menu and you are prompted for coordinates and number of iterations. I recommend starting with the following numbers as this

---

Jeremy Spiller is a 17-year old high school student who is planning to attend college in the fall. He has been writing programs since he was 12 years old. He is the owner of his own company, Gosub Software. Marty Spiller is a dentist who programs and writes as a hobby.The authors may be contacted at P.O. Box 610, Townsend, MA 01469.

is the most interesting part of the 4-by-4 box the program was built to explore.

Real axis low range — -2 (minus 2)
Real axis high range — +0.6
Imaginary axis low range — -1 (minus 1)
Imaginary axis high range — +1
Iterations — 60

When prompted for a filename, choose one with seven or fewer letters. The program saves a screen as four separate files. A number is added to the filename on each of the four files so the program can load them back into the computer in correct order. Each screen save takes up 16 granules of disk space.

There are many bugs scattered throughout other parts of the complex plane. However, this one is probably the biggest, and it happens to be conveniently close to zero in both axes. This saves on significant figures (you'll find out why this is important later). While everyone should start with these coordinates for his or her first picture, the program makes it easy to choose the numbers to use for all succeeding enlargements. The program is self-prompting; simply enter all five numbers when the program asks for them. After you enter the number of iterations, the screen should clear, and you will begin to see pixels being set in the lower left corner. It should take about twelve hours to complete the first screen and then you will meet your first Mandelbrot bug.

Colors and the Number of Iterations

For all enlargements that follow your first screen, as well as for screens in which you expect no very large areas of black, you should use at least 100 iterations (preferably 300). The computer must test each pixel on the screen to see if it is a member of the set. This test must be carried out several times. The more times (iterations) you test the point, the more confidence you have that the point is, or is not, a member of the set. It should be noted here that all points that prove to be members of the set appear on the screen in black. The colored points are not actually members. The colors chosen for points that are not members of the set depend on how close they are to being included in the set. It turns out that the most interesting parts of the Mandlebrot set lie close to the boundaries, just outside of it.

The main disadvantage of using a lot of iterations is the amount of time it takes to complete a screen. As you enlarge closer and closer to a boundary, the program must spend more and more time iterating the testing loop before it breaks out and sets a point. This is especially true if your new enlargement contains large areas that were set in black on the preceding enlargement. Some enlargements may take three or four days to complete. On the other hand, if the number of iterations is set too low, areas that should be in color will be black; areas that should be black will not show their true shape.

Choosing Your Next Enlargement

Once a screen is complete, a flashing cursor appears at the bottom left. The cursor may be moved to any point on the screen using the arrow keys. Shifted arrow keys produce faster movement. Place the cursor directly over the area you want to enlarge and press a number key (1 through 6). A box appears on the screen around the spot where the cursor was located. While the program is in the box mode, the cursor disappears. Higher-number keys produce larger boxes.

If you chose the wrong size box, try a different number key. This erases the original box and replaces it with another. Pressing any key other than the appropriate number keys erases the box and returns the cursor. When you have boxed the exact area you want to enlarge, press ENTER. Note: Don't enlarge areas that are all black (inside a bug) because you will get nothing but a totally black screen. It is OK to include some areas that you know will be black, but be aware that large areas of black slow down construction considerably. The areas you should be most interested in enlarging are located in the confetti surrounding the bug.

The Secondary Menu

Pressing ENTER from the graphics screen or BREAK from any point in the program brings you to the secondary menu. Here you see the exact coordinates for enlarging the area within the box you chose. You should copy these numbers down for future reference in case you ever need to reconstruct the same screen from scratch. (Note that the box has already been removed from the screen at this point so the screen has not been damaged.) You may begin construction of the new enlargement using these coordinates by choosing Option 1. It is best, however, to save the screen in memory first since using Option 1 clears the graphics in memory.

Saving a Screen

You may save the screen you have just completed to disk (or tape, for those with very good tape recorders and brand-new tapes) by choosing Option 3. Saving a screen does not affect the parameters you found using the box function. The screen is saved as four files using the filename you entered when you first ran the program. When you save a screen, the program encodes seven variables into the data (real and imaginary ranges, the number of iterations and two variables to make it possible to complete a screen saved in a partially completed state). When you reload, the program automatically knows the original parameters used to draw the picture and returns accurate enlargement parameters using the box function. Make multiple saves and save a screen several times during construction to avoid having to rebuild the entire thing from scratch in case of a power failure.

Running Your Next Enlargement

Before running your next enlargement, give it a new filename (seven letters or less), and possibly change the number of iterations. These options are automatic whenever you choose 1 from the secondary menu. Answer the prompts and the computer begins your next enlargement using the parameters that you found earlier with the box routine.

Saving and Restarting an Incomplete Picture

If you need the computer for other purposes while it is working on a screen, just press the BREAK key. This returns you to the secondary menu. Simply save the incomplete screen using Option 3 as you would for a completed picture. You may shut the computer down or use it for anything else by typing `NEW`. When you want to restart the picture, load and run the main program and reload the screen using Option 2 from the main menu. Once reloaded, go to the secondary menu by pressing ENTER and choose Option 5. This restarts construction. It's that simple!

The Mandelbrot Set

The Mandelbrot set represents a very important event in the study of natural phenomena — the birth of the science of chaos. Why would anyone want to study chaos? The answer is that we live in a chaotic world, and this chaos frequently produces the most complex and interesting phenomena in nature. How can a relatively few genes produce the infinite complexity of the neuronal connections in the human brain? How do these connections produce thought and behavior? How does a huge mass of quarks and leptons with weird properties produce matter with familiar properties? Why are the very best computer models unable to predict the weather for more than three days in advance? Until the birth of the science of chaos, scientists had gone about as far as they could go in answering these questions. Phenomena of this nature is difficult to break down into pieces small enough for analytical science to digest. Experiments designed to investigate questions like these tended to be very dependent on tiny variations in starting conditions, and the data they produced tended to be chaotic and impossible to interpret.

Benoit Mandelbrot, however, had a head for shapes. Whenever he was confronted by a problem, he looked for patterns he could relate to geometric forms. He discovered he could analyze data that made absolutely no sense to anyone else by looking for obscure patterns and then finding ways of making these patterns apparent to other people. The trick was to find a way of making the patterns apparent.

In the mid '60s the age of the computer was just dawning, and Mandelbrot had access to the computers at the IBM research laboratory. He discovered that by choosing unusual coordinates, he could often make his computer use chaotic data to draw out the shapes in his mind. To his own amazement when he looked closely at the computer patterns, he discovered there was a lot of detail he had not noticed before. There were smaller patterns within the larger patterns, and there were even smaller patterns within these.

Fractals

Mandlebrot coined the term *fractal* to describe this pattern-within-a-pattern solution to chaotic mathematical and physical systems. In general his first solutions tended to be pictures that looked the same at any scale. Picture a branch with little branches shooting out of it. Now picture the smaller branches with twigs coming from them. Then look at each twig and picture smaller twigs shooting off. Look at these tiny twigs and you see even tinier twigs . . . and so on to infinitely tiny branches. Fractal structure occurs freely in nature in the form of trees, blood vessels, snowflakes and mineral crystals, to name only a few.

Cartesian Coordinates and the Complex Plane

Most readers are familiar with Cartesian coordinate mapping. To set a pixel on your graphics screen, you must specify an *x* and *y* coordinate. The *x* coordinate tells the computer how many bits or bytes to go to the right, and the *y* coordinate tells how many to go down the screen before plotting the pixel. Each axis can be assigned to represent a particular variable, quantity or quality. Thus, you can use data to chart the price of gold against an array of dates or wind resistance against velocity. Or you can use a mathematical formula to plot values of *x* against the calculated values of *y*. You end up with a curve or a shape defined by the coordinates. Once you have defined the coordinates, the screen itself becomes what mathematicians call a *phase space*. One of the most interesting phase spaces (coordinate systems) in abstract mathematics involves plotting real numbers against imaginary numbers. The phase space created when you plot real numbers against imaginary numbers is called the *complex plane*.

Real numbers are what we deal with every day — positive numbers, negative numbers, integers and fractions. These are plotted on the horizontal axis — negative numbers on the left, positive numbers on the right, and of course zero in the middle. Imaginary numbers also come in positive, negative, integer and fraction. The difference is that imaginary numbers represent the square root of negative numbers. What number multiplied by itself gives you -4? Nothing! No number multiplied by itself can return a negative number. That's how imaginary numbers got the name. They may be imaginary, but they fulfill several purposes in abstract mathematics.

Any imaginary number can be represented by a real number multiplied by the square root of -1 (which is, of course, an imaginary number). The square root of -1 is generally represented by an italicized lowercase *i*. The vertical axis therefore looks much like the horizontal axis. Positive imaginary numbers go from zero up the *y* axis, and negative ones go from zero down. Each number on the imaginary axis is simply a real number followed by *i*.

One additional complication to standard Cartesian mapping paves the way for the Mandelbrot set. Standard geometry takes an equation and graphs the set of points that satisfies it. Once plotted in its phase space, the set usually takes on the shape of a line, a curve or the outline of a shape. Equations that produce more or less simple curves and shapes are called *linear functions*. Scientists like to find linear functions to describe nature because of their simplicity, and in general many natural phenomena can be described in this fashion.

An alternative method of drawing a linear curve is to have your computer examine each point in the phase space, plugging the *x* and *y* values of the point into the equation to see if it balances (totals zero). If it does, that point is a member of the set. If you do it this way, you end up with the same curve you would get if you simply used the equation to calculate the value of *y* against values of *x*. At first glance this may seem a silly waste of time. Why bother checking out points on a trial-and-error basis if you can use the equation to calculate all the points that are members of the set? The reason is that most of the functions that describe chaotic behavior in the real world do not have linear solutions. In other words, these functions may produce thousands, even millions of values of *y* for any given value of *x* instead of the one or two you would expect from a linear function.

An excellent example of a solution to a non-linear problem is BASIC's `PAINT` command. You specify a point to begin painting and a border color to tell the computer where to stop painting, and an entire area of the phase space (defined by *x* and *y* coordi-

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nates) becomes a solid color. BASIC does this by checking to the right and left of the start pixel and painting until it reaches a pixel set in the border color. Then it looks up and down and repeats the process over and over again until the area is painted. Instead of using a mathematical formula to decide which points to set, the computer uses an iterated process (repeated over and over again). The result is not a line or the outline of a shape, but an entire irregularly shaped area of set points.

The CoCo Microscope

The Mandelbrot set uses a simple formula to test each point in the complex plane. We are using the `HSCREEN 2` graphics screen to show the results. The horizontal screen coordinates can specify any range of real numbers, and the vertical coordinates can specify any range of imaginary numbers. Real numbers might range from zero to 319 with 320 steps. The step rate here would be one whole number for each screen pixel. This would specify a very large scale, as though you were looking down upon a large landscape from an airplane. In order to keep distortion to a minimum, you would choose the same step rate (one pixel per whole number) for the vertical (imaginary) axis that would range from zero to 191. (Note: In order to avoid distortion, this program uses predefined boxes to determine enlargement parameters.)

You could, however, use a much smaller scale, say from zero to one. Now instead of looking down from an airplane onto a huge piece of phase space, you are standing on the ground looking at a much smaller area. Each pixel on the *x* axis now represents only 1/320 of a whole number. You can magnify a part of this screen as well. If you set the left side of the screen to represent 0.2 and the right side of the screen to represent 0.2005, then each of the 320 steps across the screen would represent a step rate of only .00000156 per pixel. You can think of such a scale as looking at this part of the complex plane with a microscope. BASIC allows you to carry out this process to a limit of 12 significant figures. In the above example, the second pixel would be numbered 0.20000156, eight significant figures. BASIC cannot magnify any area with a step rate of less than .000000000001. (It is true that BASIC can manage numbers smaller than this value using scientific notation, and scientific notation is essential to the correct production of the figures found in the Mandelbrot set. However, BASIC cannot add mantissas unless their magnitudes coincide.) In effect, your CoCo becomes a sort of mathematical microscope with a resolution of 1×10^{-12}.

The Mandelbrot Set

Mandelbrot invented the term *fractal* before he discovered the set that bears his name. The Mandelbrot set is a fractal in the sense that it contains detail at succeedingly smaller scales, but it is not a fractal in the sense that the pictures it produces at different scales are self-similar. Even though many of the structures you see seem to be repeated over and over again, none of them are actually identical. This fact is what makes the set so interesting to examine.

The formula that decides whether a point in phase space is a part of the set or not is a feedback loop that squares the real and imaginary coordinates, adds the original coordinates to the result, squares this new result, adds the original coordinates again, squares the result and so on for as many iterations (repetitions) as it takes to discover if the cumulative result remains within a finite range or heads off to infinity. If, after the specified number of iterations has taken place, the real and imaginary components of the result remain within an arbitrary range, (in our case, within the 4-by-4 box), then the point is considered part of the set. While 1000 iterations is considered fairly safe, in theory one can never be absolutely sure a point is really a member of the set, no matter how many iterations of the loop you run. It may remain within bounds through a billion iterations, but who knows what it would do on the billion-and-first? There is no shortcut method of predicting. ❑

CoCo 3 Disk   ECB Mod.

130	32
200	80
260	42
330	7
500	141
660	68
760	133
870	235
980	204
1110	21
1190	63
1330	42
1460	246
1540	252
1700	218
END	218

The Listing: `MANDEL`

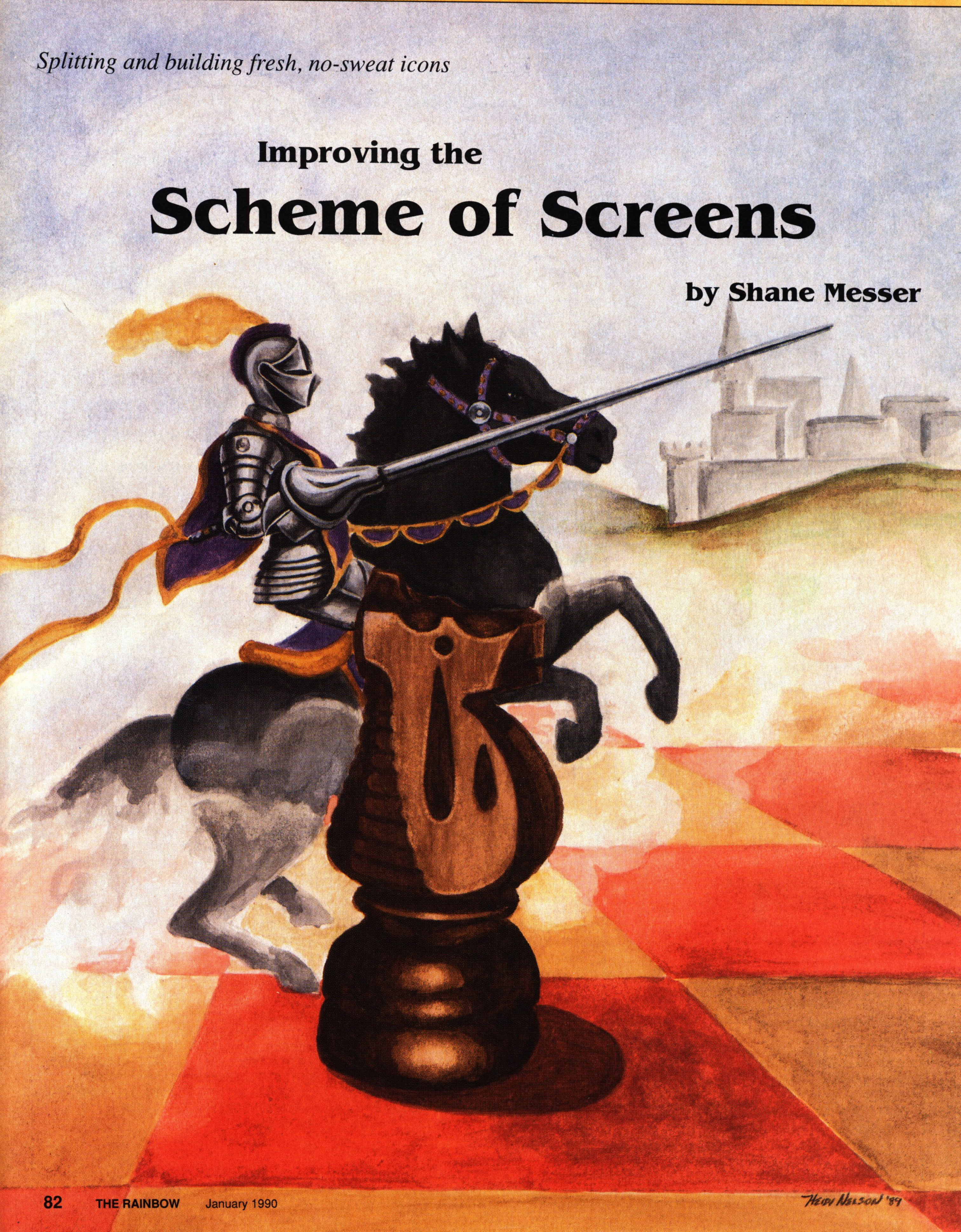
```
0 'COPYRIGHT 1989, FALSOFT INC.
10 '*****************************
20 '*  THE MANDELBROT BUG        *
30 '*         AND THE            *
40 '*     COCO3 MICROSCOPE       *
50 '*   BY MARTY & JEREMY        *
60 '*        SPILLER             *
70 '*          1989              *
80 '*****************************
90 CLEAR 200,&H6000
100 Y=0:X=0:FY=0:FX=0:R1=0:R2=0:
I1=0:I2=0:ITER=0:
110 ON BRK GOTO 1030
120 HSCREEN2:HBUFF 1,600:HCOLOR0
:HSCREEN0
130 POKE &HE6C6,33: REM DISABLES
 AUTOMATIC HSCREEN CLEAR
140 CLS:INPUT"ARE YOU USING AN R
GB MONITOR    (Y OR N)";RB$:IF R
B$<>"Y" AND RB$<>"N" THEN 140
150 '*******MAIN MENU**********
160 CLS:PRINT"MANDELBROT'S BUG A
ND THE COCO   MICROSCOPE"
170 PRINT:PRINT:PRINT"1. LOAD A
PICTURE (COMPLETE OR     INCOMPL
ETE)"
180 PRINT:PRINT"2.CREATE A PICTU
RE FROM SCRATCH"
190 PRINT:PRINT"3. GO TO SECONDA
RY MENU (DON'T     DO THIS UNLES
S THERE IS A       PICTURE IN ME
MORY"
200 PRINT:PRINT"4. RUN A DIRECTO
RY ON DRIVE (0)":REM TEAP USERS
DELETE THIS LINE
210 INPUT A:IF A<1 OR A>4 THEN 2
10:REM TAPE USERS CHANGE >4 TO >
3
220 IF A=1 THEN INPUT"ENTER FILE
NAME";F$:GOSUB 1740:GOTO 1340
230 IF A=2 THEN GOSUB 270:GOTO36
0
240 IF A=3 THEN GOTO 1030
250 DIR:PRINT:PRINT"THERE ARE";:
PRINT FREE(0);:PRINT"FREE GRANUL
ES ON    THIS DISK.  IT TAKES 16
 TO SAVE A SCREEN":PRINT:REM TAP
E USERS DELETE THIS LINE
260 INPUT"<ENTER> TO GO BACK TO
MENU";A:GOTO 150:REM TAPE USERS
DELETE THIS LINE
270 '*****ENTER PARAMETERS******
275 FY=0:FX=0
280 CLS:INPUT"INPUT REAL NUMBER
LOW END RANGE";R1
290 INPUT"INPUT REAL NUMBER HIGH
 END RANGE";R2
300 INPUT"INPUT IMAGINARY NUMBER
 LOW END RANGE";I1
310 INPUT"INPUT IMAGINARY NUMBER
 HIGH END RANGE";I2
320 INPUT"INPUT THE NUMBER OF IT
```

```
ERATIONS";ITER
330 INPUT"NAME OF FILE (7 LETTER
S OR LESS)";F$:IF LEN(F$)>7 THEN
 330
340 RSTEP=(R2-R1)/320
350 ISTEP=(I2-I1)/192:RETURN
360 GOSUB 1740:HSCREEN 2:HCLS 1:
POKE65497,0
370 IMAG=I1
380 '****MAIN LOOP MANDELBROT AL
GORITHM****
390 REM LINES 470 TO 520 HAVE BE
EN COMPRESSED TO SPEED EXECUTION
400 FOR Y=FY TO 191
410 REAL=R1
420 IMAG=I1+Y*ISTEP
430 FOR X=FX TO 319
440 REAL=R1+X*RSTEP
450 ICOMP=0
460 RCOMP=0
470 FORIN=1TOIT
480 RI=RC*RC-IC*IC+RE
490 IC=RC*IC*2+IM
500 RC=RI
510 IFRC>2ORRC<-2ORIC>2ORIC<-2TH
EN540
520 NEXTIN
530 C=0:GOTO 550
540 C=INT(SQR(255/ITER*INDX))
550 HSET(X,191-Y,C)
560 NEXT X:FX=0:NEXT Y
570 '*******CURSOR ROUTINE*****
580 POKE 65496,0
590 XC=20:YC=180
600 HSCREEN2:GOSUB 1740
610 P1=HPOINT(XC,YC)
620 P2=HPOINT(XC+1,YC)
630 P3=HPOINT(XC,YC+1)
640 P4=HPOINT(XC+1,YC+1)
650 C=C+1:IF C>15 THEN C=0
660 HSET(XC,YC,C):HSET(XC+1,YC,C
):HSET(XC,YC+1,C):HSET(XC+1,YC+1
,C):A$=INKEY$
670 HSET(XC,YC,P1)
680 HSET(XC+1,YC,P2)
690 HSET(XC,YC+1,P3)
700 HSET(XC+1,YC+1,P4)
710 IF A$<>"" THEN 730
720 GOTO650
730 IF A$=CHR$(94) THEN YC=YC-1:
IF YC<12 THEN YC=12
740 IF A$=CHR$(10)THEN YC=YC+1:I
F YC>180 THEN YC=180
750 IF A$=CHR$(9)THEN XC=XC+1:IF
 XC>300 THEN XC=300
760 IF A$=CHR$(8) THEN XC=XC-1:I
F XC<20 THEN XC=20
770 IF A$=CHR$(95)THEN YC=YC-10:
IF YC<12 THEN YC=12
780 IF A$=CHR$(91)THEN YC=YC+10:
IF YC>180 THEN YC=180
790 IF A$=CHR$(93)THEN XC=XC+10:
IF XC>300 THEN XC=300
800 IF A$=CHR$(21)THEN XC=XC-10:
IF XC<20 THEN XC=20
810 IF A$=CHR$(13) THEN 980
820 A=VAL(A$):IF A>0 AND A<7 THE
N 840
830 GOTO 610
840 '*******BOX ROUTINE********
850 HGET(XC-20,YC-12)-(XC+20,YC+
12),1
860 ON A GOSUB 890,900,910,920,8
70,880:GOTO 930
870 XL=XC-17:XH=XC+18:YH=YC-10:Y
L=YC+11:RETURN
880 XL=XC-20:XH=XC+20:YH=YC-12:Y
L=YC+12:RETURN
890 XL=XC-7:XH=XC+8:YH=YC-4:YL=Y
C+5:RETURN
900 XL=XC-10:XH=XC+10:YH=YC-6:YL
=YC+6:RETURN
910 XL=XC-12:XH=XC+13:YH=YC-7:YL
=YC+8:RETURN
920 XL=XC-15:XH=XC+15:YH=YC-9:YL
=YC+9:RETURN
930 HLINE(XL,YH)-(XH,YL),PSET,B
940 A$=INKEY$:IF A$=""THEN 940
950 HPUT(XC-20,YC-12)-(XC+20,YC+
12),1,PSET
960 IF A$=CHR$(13)THEN 980
970 A=VAL(A$):IF A>0 AND A<7 THE
N 860 ELSE 610
980 '*******CALCULATE RANGES FOR
 NEXT ENLARGEMENT*******
990 XL=R1+XL*RSTEP
1000 XH=R1+XH*RSTEP
1010 YL=I1+(191-YL)*ISTEP
1020 YH=I1+(191-YH)*ISTEP
1030 '****SECONDARY MENU*******
1040 FY=Y:FX=X-1:IF FX<0THEN FX=
0
1045 POKE 65496,0
1050 IF RB$="Y" THEN PALETTE RGB
 ELSE PALETTE CMP
1060 HSCREEN0:CLS:PRINT"YOU HAVE
 CHOSEN THE FOLLOWING   ENLARGEM
ENT PARAMETERS:"
1070 PRINT"R1=";XL;" ITER=";ITER
1080 PRINT"R2=";XH
1090 PRINT"I1=";YL
1100 PRINT"I2=";YH
1110 PRINT:PRINT"1. BEGIN CONSTR
UCTION OF NEW        ENLARGEMENT"
1120 PRINT"2. RETURN TO CURRENT
SCREEN"
1130 PRINT"3. SAVE SCREEN TO DIS
K (TAPE)"
1140 PRINT"4. MAIN MENU"
1150 PRINT"5. CONTINUE THE PARTI
ALLY COM-      PLETED SCREEN IN M
EMORY"
1160 PRINT"6. RETURN TO BASIC"
1170 INPUT A: IF A<1 OR A>6 THEN
 1170
1180 ON A GOTO 1500,600,1190,150
,1810,1830
1190 '*****SAVE SCREEN TO DISK (
TAPE USERS CHANGE "SAVEM" TO "CS
AVEM")*******
1200 P=VARPTR(R1):VA=&H67F00:GOS
UB 1640
1210 P=VARPTR(R2):GOSUB 1640
1220 P=VARPTR(I1):GOSUB 1640
1230 P=VARPTR(I2):GOSUB 1640
1240 P=VARPTR(ITER):GOSUB 1640
1250 P=VARPTR(Y):GOSUB 1640
1260 P=VARPTR(X):GOSUB 1640
1270 POKE 65496,0
1280 POKE &HFFA3,&H30:A$=F$+"1":
SAVEM A$,&H6000,&H7FFF,&HB44A
1290 POKE &HFFA3,&H31:A$=F$+"2":
SAVEM A$,&H6000,&H7FFF,&HB44A
1300 POKE &HFFA3,&H32:A$=F$+"3":
SAVEM A$,&H6000,&H7FFF,&HB44A
1310 POKE &HFFA3,&H33:A$=F$+"4":
SAVEM A$,&H6000,&H7FFF,&HB44A
1320 POKE &HFFA3,&H3B
1330 GOTO 1030
1340 '*****LOAD SCREEN FROM DISK
 (TAPE USERS CHANGE "LOADM" TO "
CLOADM")*****
1350 POKE 65496,0
1360 HSCREEN2:HCLS 1
1370 POKE &HFFA3,&H30:A$=F$+"1":
LOADM A$
1380 POKE &HFFA3,&H31:A$=F$+"2":
LOADM A$
1390 POKE &HFFA3,&H32:A$=F$+"3":
LOADM A$
1400 POKE &HFFA3,&H33:A$=F$+"4":
LOADM A$
1410 POKE &HFFA3,&H3B
1420 P=VARPTR(R1):VA=&H67F00:GOS
UB 1690
1430 P=VARPTR(R2):GOSUB 1690
1440 P=VARPTR(I1):GOSUB 1690
1450 P=VARPTR(I2):GOSUB 1690
1460 P=VARPTR(ITER):GOSUB 1690
1470 P=VARPTR(Y):GOSUB 1690
1480 P=VARPTR(X):GOSUB 1690
1490 GOSUB 340:GOTO 570
1500 '****CHANGE PARAMETERS FOR
NEW ENLARGEMENT*******
1510 CLS:INPUT"INPUT FILENAME FO
R NEW ENLARGE- MENT (7 LETTERS O
R LESS)";TEMP$:IF LEN(TEMP$)>7 T
HEN 1510
1520 INPUT"INPUT NEW NUMBER OF I
TERATIONS";TEMP
1530 PRINT"THE PARAMETERS FOR YO
UR NEXT    ENLARGEMENT ARE:"
1540 PRINT"R1=";XL
1550 PRINT"R2=";XH
1560 PRINT"I1=";YL
1570 PRINT"I2=";YH
1580 PRINT"ITER=";TEMP
1590 PRINT"FILENAME=";TEMP$
1600 INPUT"PRESS <ENTER> TO BEGI
N OR       <A> <ENTER> TO ABORT"
;A$
1610 IF A$<>"" THEN GOTO 1030
1620 R1=XL:R2=XH:I1=YL:I2=YH:F$=
TEMP$:ITER=TEMP:FX=0:FY=0
1630 GOSUB 340:GOTO 360
1640 '****POKE SCREEN VARIABLES
INTO SCREEN MEMORY******
1650 FOR TEMP=0 TO 4
1660 LPOKE VA+TEMP,PEEK(P+TEMP)
1670 NEXT TEMP
1680 VA=VA+5:RETURN
1690 '***POKE SCREEN VARIABLES I
NTO BASIC******
1700 FOR TEMP=0 TO 4
1710 POKE P+TEMP,LPEEK(VA+TEMP)
1720 NEXT TEMP
1730 VA=VA+5:RETURN
1740 '****SET PALETTES*********
1750 DATA 00,00,49,04,36,39,16,3
4,40,25,24,30,09,44,05,09,16,34,
27,46
1760 DATA 54,36,39,54,15,43,34,2
1,39,54,36,39,0
1770 IF RB$="N" THEN READ C
1780 FOR P=0 TO 15
1790 READ C:PALETTE P,C:READ C
1800 NEXT P:RESTORE:RETURN
1810 '***COMPLETE PARTIALLY COMP
LETED SCREEN******************
1820 GOSUB 1740:GOSUB 340:POKE 6
5497,0:HSCREEN2:GOTO 380
1830 END
```

Splitting and building fresh, no-sweat icons

Improving the Scheme of Screens

by Shane Messer


Heidi Nelson '89

Would you love to make games with moving icons but think it would be too difficult? If so, you will like this program. *Icon Designer* lets you create sets of 39 icons using all 16 colors, customize the palettes, and create custom sets from already existing ones. All you have to do is use the utility (Listing 3) to load them into a buffer and separate them into 39 icons. After typing the three programs, make sure you save them on several disks in case one of your disks crashes.

When you are finished, run Listing 1, `DESIGNER`. The screen clears to black and creates a grid to show you an enlarged version of your current icon. At the bottom are 16 boxes filled with color, and to the right is a list of options. To create an icon, select your color by pressing it with the arrow (use your joystick to move around). The computer beeps and displays your color next to the Current Color message. Then move the arrow to the grid and press the button corresponding to where you want to draw. While drawing, you can see the small box next to Actual Size start to fill with the color you are using. This shows what your final icon will look like.

To invert the label, press I. The icon is inverted to its opposite colors. You are again able to see it invert by the Actual Size message. If you decide you do not want to use this icon, you can clear it by pressing C. The icon is cleared to the current color you are using, so make sure you have the right color selected.

When you are finished with the icon and if you want to keep it, press P. A box appears to make sure you want this option. To continue, press Y. A box at the top of the screen appears, showing all the icons you have in your set so far. Move the arrow around until you come to the area where you want to place your icon, then press the button. The icon is put there and the program returns you to the Edit mode.

If you want to edit an icon, press G. Press Y at the prompt and again see the box of icons. Select the one you want; by pressing the button you can see the icon placed in the icon area. Next the grid adjusts to fit the icon. You can then continue editing.

Pressing A lets you alter the palette slot of a desired color. Press Y to verify your option. There is a color flickering at the bottom; move the joystick around to select the color, then press the button. After noticing the color change, adjust it by moving the joystick side to side slowly. When you come to a desired color, press the button and it changes. When you later load your saved icons, the program adjusts to the palette slots you have chosen.

Using Load and Save should be self-explanatory. One thing to note is that you need to have at least five granules left on the disk. The icon set takes four, and the data file for colors takes one. The Search and Replace option lets you replace your source color with the destination color. This option is also self-explanatory.

Listing 2, `CREATSET`, is a custom set creator. It loads one to three sets of icons and allows you to make a new set with them. Running this program prompts you to enter the filenames of the sets. When you are done, press ENTER. If you only want two sets, for example, press ENTER when you are asked for the third.

The program loads your icons and adjusts to the palette slots of the first set you selected. When the screen pops up, there is a flashing box. Use the arrow keys to move it around. When you find an icon you want in your set, press ENTER and the box moves to the lower part of the screen. This is your new set. Move the box to where you want it and press ENTER. The box goes back to the top, and you can continue until you are finished with your new set. To save the set, press S and the program prompts you for a filename. If you do not want to save it, press ENTER and you return to the program. To exit the program, type E.

The third listing, `ICONGRAB`, is a loader for your icons. It loads the desired set and separates them into 39 buffer areas. You can then use these icons in your own creations. Make sure to put the name of your icon set into Line 50 of the program.

I hope you get a lot of use from these programs. Animation should now be a little easier after putting your icons in selected areas one at a time. ❑

Shane Messer is fourteen years old and has worked on the CoCo for two years. He lives in Ft. Pierce, Florida, where he attends Lincoln Park Academy, and enjoys studying math, science and playing soccer. He may be contacted at 3625 Orange Ave., Ft. Pierce, FL 34947.

CoCo 3

190	53
270	90
390	114
430	86
460	57
540	172
620	155
720	12
790	178
870	200
940	192
1050	18
1150	213
1240	173
1340	182
1450	157
1520	251
1590	189
END	215

Listing 1: `DESIGNER`

```
10 '  -------------------
30 '      ICON  DESIGNER
40 '  -------------------
50 ' WRITTEN BY SHANE MESSER
60 '    COPYRIGHT (C) 1989
70 '     BY FALSOFT INC.
80 '   ALL  RIGHTS RESERVED
90 '  -------------------
100 '        DESIGNED
110 '  FOR THE 128K COCO 3
120 ' -------------------
130 POKE 65497,0
140 DIM PS(16)
150 '
160 ON ERR GOTO 1610
170 '
180 X=0:Y=0:X1=0:X2=0:X3=0:Y3=0:
K=0:W=0:E=0:R=0:T=0:B=0:M=0:N=0:
C=0:Z=0:A=0:A$=""
190 HSCREEN 2:POKE &HE6C6,18:POK
E &HE6C7,18:HCLS 0:RG=1:GOSUB 44
0:POKE &HE0D4,&H34:GOSUB 530:GOT
O 230
200 HPAINT(X,Y),C,15:X1=INT(X/10
):Y1=INT(Y/10):HSET(164+X1,120+Y
1,C):RETURN
210 X=JOYSTK(0):Y=JOYSTK(1):X=X*
5+1:Y=Y*3+1:IF Y>180 THEN Y=180
ELSE IF X>310 THEN X=310
220 RETURN
230 GOSUB 410
240 GOSUB 210
250 HGET(X,Y)-(X+10,Y+13),2:HDRA
W"BM=X;,=Y;C15"+AR$:HPUT(X,Y)-(X
+10,Y+13),2:IF VV=1 THEN RETURN
260 A$=INKEY$:IF A$<>"" THEN PLA
Y"T25L25O3A"
270 IF A$="I" THEN GOSUB 610
280 IF A$="L" THEN GOSUB 680
290 IF A$="S" THEN GOSUB 760
300 IF A$="C" THEN GOSUB 830
310 IF A$="P" THEN GOSUB 900
320 IF A$="G" THEN GOSUB 970
330 IF A$="R" THEN GOSUB 1050
340 IF A$="A" THEN GOSUB 1510
350 POKE 65497,0
360 GOSUB 210
370 IF BUTTON(0)=1 AND Y>179 THE
N C=HPOINT(X,Y):GOSUB 570
```

```
380 HSCREEN 2:IF BUTTON(0)=1 AND
 X>0 AND Y>20 AND X<150 AND Y<17
0 AND HPOINT(X,Y)<15 THEN GOSUB
200
390 GOTO 240
400 '----------------------------
410 GOSUB 580:HGET(0,64)-(9,96),
4:GOSUB 590:HGET(10,20)-(310,65)
,1:POKE &HFF98,128:POKE &HFF99,6
2:FOR X=0 TO 300 STEP 20:HCOLOR
Z:HLINE(X,180)-(X+20,191),PSET,B
F:Z=Z+1:NEXT X
420 B$="R5D5L5U5R5":FOR X=0 TO 1
40 STEP 10:FOR Y=20 TO 160 STEP
10:HDRAW"S8BM =X;,=Y;C15"+B$:NEX
T Y,X
430 HCOLOR 15:A$="     Icon desig
ner - By Shane Messer":HPRINT(0,
0),A$:HCOLOR 15:A$="     Copyrigh
t (c) 1989, By Falsoft Inc.":HPR
INT(0,1),A$
440 PALETTE 0,0:PALETTE 1,32:PAL
ETTE 2,36:PALETTE 3,52:PALETTE 4
,54:PALETTE 5,18:PALETTE 6,25:PA
LETTE 7,45:PALETTE 8,16:PALETTE
9,9:PALETTE 10,12:PALETTE 11,23:
PALETTE 12,43:PALETTE 13,56:PALE
TTE 14,35:PALETTE 15,63
450 PS(1)=0:PS(2)=32:PS(3)=36:PS
(4)=52:PS(5)=54:PS(6)=18:PS(7)=2
5:PS(8)=45:PS(9)=16:PS(10)=9:PS(
11)=12:PS(12)=23:PS(13)=43:PS(14
)=56:PS(15)=35:PS(16)=63
460 IF RG=1 THEN RG=0:RETURN
470 FOR K=1 TO 16:PALETTE K-1,PS
(K):NEXT K
480 FOR Y=6 TO 13:READ A$:HPRINT
 (20,Y),A$:NEXT Y
490 HPRINT(24,16),"- Actual size
"
500 HPRINT(24,19),"- Current col
or"
510 C=1:GOSUB 570
520 GOTO 540
530 HBUFF 1,6946:HBUFF 2,110:HBU
FF 3,160:HBUFF 4,700:GOSUB 580:L
POKE &H6E000,255:LPOKE &H6E001,2
55:HBUFF 1,6946:HBUFF 2,110:HBUF
F 3,160:HBUFF 4,700:GOSUB 590
540 AR$="S4D10M+1,-1U8M+1,+1D6RD
RD2RD2RULU2LU2LU5M+1,+1D3RU2M+1,
+1DR"
550 RETURN
560 DATA (I)nvert,(C)lear,(P)ut
Icon into set,(A)lter palette sl
ot,(G)et icon from set,(L)oad ic
on set,(S)ave icon set,(R)eplace
 colors
570 PLAY"T25L25O3A":HCOLOR C:HLI
NE(163,148)-(178,163),PSET,BF:RE
TURN
580 POKE &HE0D4,&H37:RETURN
590 POKE &HE0D4,&H34:RETURN
600 RETURN
610 'INVERT
620 QQ=C:A$="*** Invert current
icon ***":GOSUB 1110:IF NO=1 THE
N RETURN
630 FOR X2=0 TO 32 STEP 2:FOR Y2
=6 TO 55 STEP 3:X=X2*5+1:Y=Y2*3+
1
640 IF X>0 AND Y>20 AND X<150 AN
D Y<170 AND HPOINT(X,Y)<15 THEN
GOSUB 660
650 NEXT Y2,X2:C=QQ:RETURN
660 Z=HPOINT(X,Y):C=14-Z:GOSUB 2
00:RETURN
670 RETURN
680 ' LOAD
690 A$="*** Load a new set from
disk ***":RT=0:GOSUB 1110:IF NO=
1 THEN RETURN
700 RT=1234:A$="*** Insert your
disk ***":B$="Press any key":GOS
UB 1110
710 GOSUB 1380
720 POKE 65496,0:IF NO=0 THEN PO
KE &HE0D4,&H34:POKE &HFFA2,&H34:
LOADM F$:POKE &HFFA2,&H3A:POKE &
HE0D4,&H34
730 IF NO=0 THEN SF$=LEFT$(F$,IN
STR(F$,".")-1)
740 IF NO=0 THEN OPEN"I",#1,SF$:
FOR K=1 TO 16:INPUT #1,PS(K):PAL
ETTE K-1,PS(K):NEXT K:CLOSE:RETU
RN
750 RETURN
760 'SAVE
770 A$="*** Save current set to
disk ***":GOSUB 1110:IF NO=1 THE
N RETURN
780 RT=1234:A$="*** Insert your
save disk ***":B$="Press any key
":GOSUB 1110
790 GOSUB 1380
800 POKE 65496,0:IF NO=0 THEN PO
KE &HE0D4,&H34:POKE &HFFA2,&H34:
SAVEM F$,&H4000,&H5FFF,&HA027:PO
KE &HFFA2,&H3A:POKE &HE0D4,&H34:
SF$=LEFT$(F$,INSTR(F$,".")-1)
810 IF NO=0 THEN OPEN"O",#1,SF$:
FOR K=1 TO 16:WRITE #1,PS(K):NEX
T K:CLOSE:RETURN
820 RETURN
830 ' CLEAR
840 A$="*** Clear current icon *
**":GOSUB 1110
850 IF NO=1 THEN RETURN
860 FOR X2=0 TO 32 STEP 2:FOR Y2
=6 TO 55 STEP 3:X=X2*5+1:Y=Y2*3+
1
870 IF X>0 AND Y>20 AND X<150 AN
D Y<170 AND HPOINT(X,Y)<15 THEN
GOSUB 200
880 NEXT Y2,X2
890 RETURN
900 ' PUT
910 A$="*** Put icon into set **
*":GOSUB 1120:IF NO=1 THEN RETUR
N
920 GOSUB 1240
930 HGET (164,122)-(178,136),3:H
PUT(C1,C2)-(C1+14,C2+14),3
940 GOSUB 1330
950 RETURN
960 RETURN
970 ' GET
980 A$="*** Get icon and erase c
urrent one ***":GOSUB 1120:IF NO
=1 THEN RETURN
990 GOSUB 1240
1000 HGET (C1,C2)-(C1+14,C2+14),
3
1010 HPUT(164,122)-(178,136),3
1020 GOSUB 1330
1030 QQ=C:FOR X2=0 TO 14:FOR Y2=
0 TO 15:X=X2*10+1:Y=Y2*10+21:C=H
POINT(164+X2,122+Y2):HPAINT(X,Y)
,C,15:NEXT Y2,X2:HCOLOR QQ:C=QQ
1040 RETURN
1050 QQ=C:A$="*** Replace Source
 color with dest. ***":GOSUB 11
10:IF NO=1 THEN RETURN
1060 GOSUB 1490:IF NO=1 THEN RET
URN:ELSE HSCREEN 2:FOR X2=0 TO 1
4:FOR Y2=0 TO 14:X=X2*10+1:Y=Y2*
10+21:C=HPOINT(164+X2,122+Y2)
1070 IF C=V1 THEN HSET(164+X2,12
2+Y2,V2):HPAINT(X,Y),V2,15
1080 NEXT Y2,X2
1090 C=QQ
1100 RETURN
1110 ' * ARE YOU SURE *
1120 GOSUB 580
1130 A=LEN(A$):A=40-A:A=INT(A/2)
:A$=STRING$(A," ")+A$
1140 IF RT<>1234 THEN B$="Are yo
u sure?"
1150 B=LEN(B$):B=40-B:B=INT(B/2)
:B$=STRING$(B," ")+B$
1160 RT=0
1170 HGET(0,64)-(320,96),1
1180 FOR X=0 TO 320 STEP 10:HPUT
(X,64)-(X+9,96),4:NEXT X
1190 HCOLOR 15:HLINE(0,64)-(320,
96),PSET,B:HPRINT(0,9),A$:HPRINT
(0,10),B$
1200 A$=INKEY$:IF A$="" THEN 120
0
1210 IF A$="Y" OR A$="y" THEN YS
=1:NO=0 ELSE YS=0:NO=1
1220 HPUT(0,64)-(320,96),1
1230 GOSUB 590:RETURN
1240 GOSUB 580
1250 HGET(10,20)-(220,65),1
1260 GOSUB 590
1270 HPUT(10,20)-(220,65),1
1280 '  MAIN ROUTINE TO SELECT
1290 X=JOYSTK(0):Y=JOYSTK(1):X=I
NT(X/5):Y=INT(Y/30)
1300 X1=X:Y1=Y:X=X*16+10:Y=Y*15+
20:VV=1:X=X+5:Y=Y+5:GOSUB 250:X=
X-5:Y=Y-5:VV=0
1310 IF BUTTON(0)=1 THEN C1=X+1:
C2=Y:RETURN
1320 GOTO 1290
1330 ' END OF MAIN ROUTINE
1340 HGET(10,20)-(220,65),1
1350 GOSUB 580
1360 HPUT(10,20)-(220,65),1
1370 RETURN
1380 WIDTH 40:CLS 2:ATTR 0,1:CLS
1390 A$="*** ENTER FILENAME ***"
:GOSUB 1480:PRINT:PRINT:A$=STRIN
G$(4,CHR$(8))+"->":GOSUB 1480:LI
NEINPUT F$:HSCREEN 2
1400 WIDTH 40:IF F$="DIR" THEN P
OKE 65496,0:DIR:PRINT"Free ->";F
REE(0):EXEC44539:HSCREEN 2:F$=""
1410 NO=1:IF LEN(F$)>12 THEN RET
URN
1420 IF F$="" THEN RETURN ELSE I
F INSTR(F$,".")>9 THEN RETURN
1430 FOR K=1 TO LEN(F$):IF MID$(
F$,K,1)="/" THEN MID$(F$,K,1)=".
"
1440 NEXT K
1450 IF LEN(F$)>8 AND INSTR(F$,"
.")<1 THEN RETURN
1460 IF INSTR(F$,".")<1 THEN F$=
F$+".BIN"
1470 NO=0:RETURN
1480 A=LEN(A$):A=40-A:A=INT(A/2)
:PRINTSTRING$(A," ");A$;:RETURN
1490 WIDTH 40:CLS 2:ATTR 0,1:CLS
:A$="Enter source color ->":GOSU
B 1480:LINEINPUT A$:V1=VAL(A$):A
$="Enter destination color ->":G
OSUB 1480:LINEINPUT A$:V2=VAL(A$
)
1500 IF V1>-1 AND V1<15 AND V2>-
1 AND V2<15 THEN NO=0:RETURN ELS
E NO=1:HSCREEN 2:RETURN
```

Label Designer

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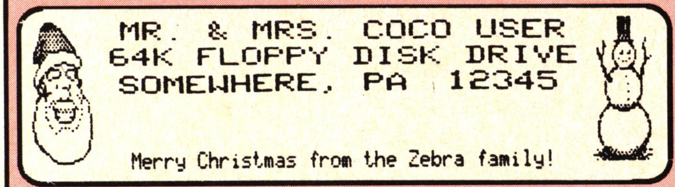
- **Standard Features:** Click and drag picture placement, up to 4 pictures per label, 3 different picture sizes, powerful text editing with variety of type fonts and sizes, prints 1-999 copies, templates for standard & large address, file folder, disk, and cassette label sizes.

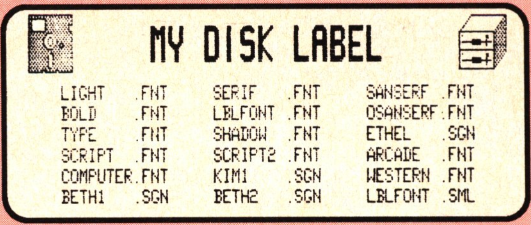


```
MR. & MRS. COCO USER
64K FLOPPY DISK DRIVE
SOMEWHERE, PA  12345

Merry Christmas from the Zebra family!
```

LABEL DESIGNER LABEL
PRINTED ON DMP105

- **Mail Merge Option** merges name and address or other text file data for printout onto your custom label templates with graphics and other text. Great for club mailings, Christmas card lists, membership name tags, etc.



```
MY DISK LABEL

LIGHT    .FNT   SERIF    .FNT   SANSERF .FNT
BOLD     .FNT   LBLFONT  .FNT   OSANSERF.FNT
TYPE     .FNT   SHADOW   .FNT   ETHEL   .SGN
SCRIPT   .FNT   SCRIPT2  .FNT   ARCADE  .FNT
COMPUTER.FNT    KIM1     .SGN   WESTERN .FNT
BETH1    .SGN   BETH2    .SGN   LBLFONT .SML
```

LABEL DESIGNER LABEL
PRINTED ON DMP105
80% OF ACTUAL SIZE

- **Disk Directory Option** pastes the names of your disk files onto the label text editor screen for inclusion on your labels.
- **Serial Numbering Option** for making sequentially numbered admission tickets, product numbering, inventory labels, etc.
- **Hardware Requirements:** CoCo II 64K, or CoCo 3, disk drive, mouse or joystick, compatible printer (compatible with same printers as CGDP except DMP-130 and DMP-130A in serial mode).
- **Includes** disk, laser typeset user's manual and sample quantities of different size labels. Price: **$34.95**

We stock white and colored labels in a variety of address, disk, and cassette sizes at competitive prices.

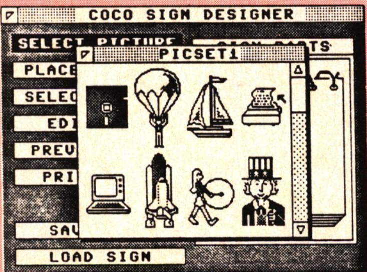
Banners, Signs & Greeting Cards

GARAGE SALE
SAT & SUN
APRIL 12-13
34 HILLTOP LANE
GREENLAWN
COMPUTER FAIR
JULY 24
GET YOUR TICKETS TODAY!
DANGER
DO NOT ENTER
HAPPY
MOON UNIT
THIN MUFFIN

The CoCo Graphics Designer Plus, produces beautiful greeting cards, banners, and signs for holidays, birthdays and other occasions.

The CGDP features an easy-to-use point and click graphical interface with windows, scroll bars, radio buttons, and joystick or mouse control. Text can be used in up to 4 sizes and 16 fonts per page. Picture, Font, and Border collections are included. Signs and cards can be previewed on screen.

Read the review in May 89 Rainbow.
CGDP Disk & 64 page typset manual. **$29.95**



Picture Selection Screen

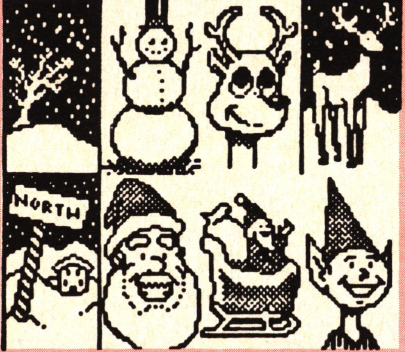
Requirements: CoCo II 64K or CoCo III, disk drive, RSDOS, joystick or mouse. Printers supported include: Epson RX/FX/LX, Gemini 10X, SG10, NX10, NX1000, DMP105/106/110/120/130/132/200/400, Panasonic KXP1080 / 90 /91/92, Prowriter, C.Itoh 8510, Okidata 92/93/182/183 & more.

Label Designer & CGDP

Optional Picture, Font, and Border disks.

$14.95 each.

Picture Disk #2 4 sets of 30 pictures ea., Sports, America, Party, Office, Total 120 pictures.
Picture Disk #3 4 sets of 30 pictures ea. Animals, Nature, Religion, Travel, Total 120 pictures.
Picture Disk #4 120 Holiday Pictures: Christmas, Chanukah, Thanksgiving, New Year's, Easter, Halloween, etc.
Font Disk A 10 Fonts: Western, Stencil, Banner, Shadow, Variety, Type, Stripes, Digital, Bold3, Object
Font Disk B 10 Fonts: Arcade, Circle, Alien, Cube, Baroque, Deco, Block, Gray, Computer, Script
Border Disk #1 Contains 176 High resolution borders, great variety from simple to ornate. (The border disk is for use with the CGDP, but not with the Label Designer).



These are a few samples from the 120 Holiday Pictures on Picture Disk#4 for the CoCo Graphics Designer Plus and Label Designer. Merry Christmas!

HARDWARE

Color Computer Mouse (Quantities Limited)	19.95
Atari-To-CoCo Joystick Adaptor	12.95
WICO Trackball Controllers	29.95
HDS Floppy Disk Controllers with RS ROM	59.95
Disk Drive Case & Power Supply	35.00
Wildcard Cartridge Emulator	109.95

SOFTWARE

Car Sign Designer	14.95
Disk Utility 2.1a	14.95
Printer Font Generator	14.95
Multi-Pak Crack	14.95
Telepatch III	14.95
Tape/Disk Utility	14.95

Ordering Instructions: All orders add $3.00 Shipping & Handling, UPS COD add $3.00. VISA/MC Accepted. PA residents add sales tax. Hours 9-5 Monday to Friday. **We offer comprehensive sales and customer support for Zebra Systems Products.**

Paul & Tony's Stereo• 121 S. Burrowes Street• State College, PA 16801• (814) 237-2652

```
1510 A$="*** Alter palette slots
 ***":GOSUB 1110:IF NO=1 THEN RE
TURN ELSE QQ=C
1520 X=JOYSTK(0):X=INT(X/3)
1530 IF X>15 THEN X=16
1540 HGET(X*20,180)-(X*20+20,191
),4:HPUT(X*20,180)-(X*20+20,191)
,4,PRESET:HPUT(X*20,180)-(X*20+2
0,191),4,PSET
1550 IF BUTTON(0)=1 THEN 1570
1560 GOTO 1520
1570 IF BUTTON(0)=1 THEN 15701580
X=X+1
1590 PS(X)=JOYSTK(0):PALETTE X-1
,JOYSTK(0):IF BUTTON(0)=1 THEN 1
600 ELSE 1590
1600 IF BUTTON(0)=1 THEN 1600 EL
SE RETURN
1610 HSCREEN2:POKE 65497,0:V=ERN
O:ER$="Unknown Error!"
1620 IF V=20 THEN ER$="I/O Error
!" ELSE IF V=10 THEN ER$="Device
 number error!" ELSE IF V=31 OR
V=26 THEN ER$="Unlocatale disk n
ame!" ELSE IF V=23 THEN ER$="Inp
ut past end of file!" ELSE IF V=
1 THEN ER$="Syntax Error in line
"+STR$(ERLIN)
1630 A$=ER$:B$="Press any key":R
T=1234:GOSUB 1110:GOTO 300
```

150 91
260 71
330 231
400 85
500 138
580 182
END 255

Listing 2: CREATSET

```
10 '    --------------------
30 ' CUSTOM ICON SET CREATOR
40 '    --------------------
50 ' WRITTEN BY SHANE MESSER
60 '     COPYRIGHT (C) 1989
70 '       BY FALSOFT INC.
80 '    ALL  RIGHTS RESERVED
90 '    --------------------
100 '          DESIGNED
110 '   FOR THE 128K COCO 3
120 '   --------------------
130 POKE 65497,0:ON BRK GOTO 130
:ON ERR GOTO 620
140 GOSUB 300:X=0:Y=0
150 GOTO 470
160 FOR T=338 TO 345:POKE T,255:
NEXT T:A$=INKEY$:IF A$="" THEN A
$=" "
170 IF A$="^" THEN Y=Y-1
180 O=ASC(A$):IF O=9 THEN X=X+1
ELSE IF O=10 THEN Y=Y+1
190 IF O=8 THEN X=X-1
200 IF O=13 THEN RETURN
210 IF O=83 THEN GOSUB 560
220 IF O=69 THEN GOSUB 540
230 IF X<MX THEN X=MX
240 IF Y<MY THEN Y=MY
250 IF X>XX THEN X=XX
260 IF Y>YY THEN Y=YY
270 POKE 65497,0
280 HGET(X*16-5,Y*15)-(X*16+8,Y*
15+14),1:HCOLOR 15:HLINE(X*16-5,
Y*15)-(X*16+8,Y*15+14),PSET,B:HP
UT(X*16-5,Y*15)-(X*16+8,Y*15+14)
,1
290 GOTO 160
300 ON BRK GOTO 300:DIM PS(16):H
SCREEN 2:HCLS 0:HBUFF 1,4000:HBU
FF 2,2000:POKE &HE6C6,0
310 ON BRK GOTO 50:CMP:WIDTH 40:
CLS 3:ATTR 2,4:CLS:FOR H=1 TO 3
320 ON BRK GOTO 320:CLS:PRINT"Wh
at is the filename of icon set"+
STR$(H)+"       ->";:LINEINPUT F$
330 IF F$="" AND H>1 THEN 390 EL
SE IF F$="" THEN CLS4:ATTR 2,4:C
LS:PRINT"           No icons selec
ted!":END
340 IF H=1 THEN A$=F$
350 POKE 65496,0:POKE &HE0D4,&H3
4:POKE &HFFA2,&H34:POKE 65496,0:
LOADM F$:POKE &HFFA2,&H3A:POKE &
HE0D4,&H34
360 HSCREEN 2:HPUT(10,(H-1)*45)-
(220,H*45),1
370 WIDTH 40:CLS 3:ATTR 2,4:CLS
380 NEXT H
390 HSCREEN 2
400 IF INSTR(A$,".")>0 THEN A$=L
EFT$(A$,INSTR(A$,".")-1)
410 OPEN"I",#1,A$:FOR K=1 TO 16:
INPUT #1,PS(K):PALETTE K-1,PS(K)
:NEXT:CLOSE
420 POKE 64597,0:HSCREEN 2
430 HCOLOR 15:HLINE(222,0)-(319,
191),PSET,B
440 FOR K=1 TO 20:READ A$:A=LEN(
A$):A=12-A:A=INT(A/2):A$=STRING$
(A," ")+A$:HPRINT(28,K),A$:NEXT
450 RETURN
460 DATA Icon Desg.,Customizer,-
-----------,Written by,Shane,Mes
ser,------------,Copyright,(c) 1
989,By Falsoft,------------,,Opt
ions,-------,(E)xit ,(S)ave ,...,
,,,,,,,,,,
470 ON BRK GOTO 470:MX=1:MY=0:XX
=13:YY=8:GOSUB 160
480 FX=X:FY=Y
490 ON BRK GOTO 490:MX=1:MY=9:XX
=13:YY=11
500 IF PEEK(338)=191 THEN 500
510 GOSUB 160
520 HGET(FX*16-5,FY*15)-(FX*16+8
,FY*15+14),1:HPUT(X*16-5,Y*15)-(
X*16+8,Y*15+14),1
530 GOTO 470
540 WIDTH 40:CLS 3:ATTR 2,4:CLS:
LINEINPUT"                    Exit
                               Are
 you sure ->";Y$
550 IF LEFT$(Y$,1)="Y" OR LEFT$(
Y$,1)="y" THEN WIDTH 32:CLS:CMP:
POKE 65496,0:END ELSE HSCREEN 2:
RETURN
560 WIDTH 40:CLS 3:ATTR 2,4:CLS:
LINEINPUT"                    Save
                               Fil
ename:";F$
570 IF F$="" THEN HSCREEN 2:RETU
RN
580 POKE 65496,0:HSCREEN 2:POKE
&HE0D4,&H34:HGET(10,135)-(220,18
0),1:POKE &HFFA2,&H34:SAVEM F$,&
H4000,&H5FFF,&HA027:POKE &HFFA2,
&H3A
590 IF INSTR(F$,".")>0 THEN F$=L
EFT$(F$,INSTR(F$,".")-1)
600 OPEN"O",#1,F$:FOR K=1 TO 16:
WRITE #1,PS(K):NEXTK:CLOSE
610 HSCREEN 2:RETURN
620 POKE 65496,0:V=ERNO:ER$="Unk
nown Error!"
630 IF V=20 THEN ER$="I/O Error!
" ELSE IF V=10 THEN ER$="Device
number error!" ELSE IF V=31 OR V
=26 THEN ER$="Unlocatale disk na
me!" ELSE IF V=23 THEN ER$="Inpu
t past end of file!" ELSE IF V=1
 THEN ER$="Syntax Error in line"
+STR$(ERLIN)
640 A$=ER$:WIDTH 40:CMP:CLS 4:AT
TR 2,4:CLS:FOR K=1 TO 10:PRINT:N
EXT K:K=LEN(A$):K=40-K:K=INT(K/2
):LOCATE K,11:PRINTA$:END
```

40 172
80 238
130 179
END 84

Listing 3: ICONGRAB

```
10 ' GRABBER UTILITY FOR ICON
     DESIGNER. WRITTEN BY SHANE
     MESSER AND COPYRIGHTED BY
     FALSOFT.
20 ' THIS PROGRAM WILL GET YOUR
     ICONS FROM A FILE, AND THEN
     SEPARATE THEM INTO 39 BUFF-
     ER AREAS SO YOU CAN HPUT
     THEM BY NUMBER.
30 '-------------------------
40 FOR T=1 TO 40:HBUFF T,190:NEX
T T:POKE &HE0D4,&H37:LPOKE &H6E0
00,255:LPOKE &H6E001,255:HBUFF 1
,5000
50 F$="NEW1":POKE &HFFA2,&H37:LO
ADM F$:POKE &HFFA2,&H3A
60 OPEN"I",#1,F$:FOR K=0 TO 15:I
NPUT #1,A:PALETTE K,A:NEXT
70 HSCREEN 2:HPUT(10,10)-(220,55
),1
80 POKE &HE0D4,&H34
90 FOR H=10 TO 200 STEP 16:FOR V
=10 TO 45 STEP 15:J=J+1:HGET(H,V
)-(H+14,V+14),J:NEXT V,H:HCLS 0
100 '-------------------------
110 ' THIS RPUTINE WILL PUT THE
      ICONS ONTO THE SCREEN.
120 '-------------------------
130 K=0:FOR Y=0 TO 40 STEP 20
140 FOR X=0 TO 180 STEP 20
150 K=K+1
160 HPUT(X,Y)-(X+14,Y+14),K
170 PLAY"T10L10O3A"
180 NEXT X,Y
190 EXEC 44539
200 '-------------------------
```

BASIC Training

The Unfolding Block

by Joseph Kolar
Contributing Editor

Composing a graphics design is dynamic because there is constant evolution in the presentation of the theme. No idea is a set piece. This ensures excitement when we produce elements of an unfolding block design. The keyboard never knows what will happen next. Somehow time inexorably slips by because the graphics programmer is in absolute communion with the CoCo.

Let's dispense with our utility. Although utilities are helpful, we budding artists do not demand a crutch. When we go on a creative binge, watch out! We don't know where we are headed. We can improvise a hundred times as we go along. That is the difference between a creative innovator and a hack.

We use graph paper and scratch sheets to block out ideas and plan segments of the nebulous grand design — after all, Leonardo de Vinci and Michaelangelo made sketches.

In this, as in other tutorials, we let it all hang out — warts and all. We make mistakes, use poor judgement, and abandon half-baked ideas. This is a real-life programming effort.

The idea is to make a few shapes other than the 8-by-12 graphics characters used as raw material to whip up a graphics confection. In so doing we get plenty of practice. We are not choosy, just lazy. We chose the first `DRAW` statement from a previous tutorial, being very democratic and using what is near at hand to start somewhere — and away we go!

Type in lines 2, 10, 200 and 1000 from Listing 1. At the end of Line 10 add `:SCREEN1,0` and run the program. Trace Line 200 on graph paper. These chores are easier to do and are fun. You feel as an artist does when mixing colors on his palette in anticipation of creating the masterpiece.

Type in Line 400 to start smearing it on the canvas. We make a 4-by-8 rectangle and take our first tentative brushstrokes. Type in lines 610 through 640 ending them with Variable `A` — all four `PSET`. Then run the program and press BREAK. Change the last two to `PRESET` and run the program — not very inspiring! We abandon the idea and decide to paint, in that same area, a four-unit square consisting of `CHR$(134)` and `CHR$(137)`.

Type in lines 210 through 220 and rough them out on graph paper. Type in lines 410, 420 and 600. Edit lines 610 through 640 to end with `D`, `C`, `D` and `C`, respectively — all `PSET` and run the program. On your graph paper, block out the four-unit design near the center and add elements as you develop your work of art.

Let's put the four curlicues around this design, without regard to the standard locating points with which we worked. We locate the coordinates free-hand, using educated guesses or sneak peeks at our sketches. Then we jockey them into positions that don't jar our artistic sensibility.

Next, carefully type in lines 690 through 720 and run the program. Note that the curlicue units do not fit snugly like jigsaw puzzle pieces. They are further out and tucked closer in on the horizontal. This satisfies my whim. Had they been set symmetrically, it is almost certain the program would have evolved differently because a different perspective would have been kicking around in my mind.

Now list lines 690 through 720. Copy the `PUT` info into lines 770 through 800 with the variables unchanged — all `NOT`. Then run the program. There is a little movement to add gusto to the limp design. Run through it a few times. Did you notice that `NOT` caused the reverse image to be drawn? Change these lines to end in `AND`, then run the program. If you also try `PSET` and `PRESET`, you will find that `PSET`, `AND` and `OR` give the first image. `PRESET` and `NOT` give the reverse image.

Change Line 690 to end `PRESET`. Change Line 770 to end, in order, `PSET`, `PRESET`, `NOT`, `OR` and `AND`, one at a time. As you can see, `AND` wipes out the image and `OR` substitutes an 8-by-12 block.

Study the changes that occur. They are grist for your knowledge mill. If the previous setting in that particular location is `PRESET`, then `AND` gives you the wipe-out and `OR` gives you the mating full block. The operators (`NOT`, `AND` and `OR`) act differently on an area, depending on what state it is set.

You may want to experiment by running all five through their paces and making a list of the results in various combinations. These operators are tricky, but they are a joy to smear on the canvas to make fancy brush strokes.

Return Line 690 to `PSET` and Line 770 to `NOT`. At this point the flowering design can stand a little accent in the middle to blink on and off. Key in the line:

```
810 DRAW"BM100,100D4
```

and run the program. Change Line 810 to end in `98,D8"`. After running the program, change it to `99,D6"` and run it again. Pick a winner! All the coordinating locations are found by trial and error. This is excellent practice and is highly recommended. Once you get the feel of guiding a design element to its birth, you feel like a tugboat captain pushing here, nudging there, moving your creation ever so skillfully to where you want it anchored.

This is an important distinction: If you plot it out exactly, your design is located in

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Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

a preordained location. If you jockey it into position, you can change your mind many times and are never quite sure where it will end up. That's the uncertainty principle of creativity. (To my depraved mind it looks like a tick-tocking cuckoo clock.)

A short pause might be in order to make it more dramatic. Type in Line 820, the pause routine, and Line 830 to loop back and see our work in glorious action.

Note: To get the maximum use out of an animation sequence, keep a weather eye out for short, quickly executed program lines. They enhance the speed of the sequence because the CoCo doesn't have to read long program lines or search out long `GOSUB` routines.

How would the design look if we put a small block between each moving ticker? Type in lines 230 through 260. On graph paper copy them and shade in the colored area. It is important to visualize the shape of the raw material. The area enclosed in lines 230 and 250 is 4-by-12, while the area in lines 240 and 260 is 8-by-6.

The newly sized shapes give you the feel of working out new batches or coordinates. Without looking at the listing and using the hot scoop in lines 230 through 260, create four `GET` lines using variables `Q`, `R`, `S` and `T`, respectively. They were dimensioned at the beginning to save the bother now.

When you are finished, compare your work with Listing 1. Line 440 should show a discrepancy. Guess who made a mistake? You have `(110,0)-(118,6)`. Why didn't I spot it? I picked up the wrong block due to the error, and using the empirical method I located it in an area that did not conflict with any other design element. Therefore it never showed up. If something appears funny, spot-check the `GET` as a matter of course.

I suspect we could make one design element to serve the set of four individual ones. Copy this line on graph paper to see what it looks like:

```
DRAW"BM0,0BD6BR4BU6BR4BD6BR4BD6B
L4BD6BL4BU6R4U6L4D6BL4BU6":PAINT
(5,7),4,4
```

Later on you might want to see what you can come up with using this line. Do you see how we always manage to profit from mistakes? Ordinarily you may not think of things suggested while in hot pursuit of boo-boos.

Now let's use my trial-and-error coordinates and type in lines 650 through 680 exactly, then run the program. If only we could make the four boxes move in unison, from the center, in, out, in, etc. Our design blocks are made to order — `R` and `T` on the horizontal plane, and `Q` and `S` along the vertical axis.

Type in lines 730 through 760 exactly. Look over the coordinates, which are set to correspond in reverse with the ones in lines 650 through 690. Compare the mating lines to see what offset is made in which direction, then run the program. This should make you good and googly-eyed.

For the heck of it type in Line 685:

```
DRAW"BM100,100D4"
```

Never lose an opportunity to add variety and simulate motion. For a little variation type in Line 765 unmasked, then run the program, using `CSAVE`.

Turn your attention to Listing 2. We have to attend to a few housekeeping chores. In `PMODE3`, a four-color set, 4,4 is the default mode. Why don't we remove them from lines 210 and 220, in two places each? We discarded the `A` block in Line 200. Delete Line 200 and its associated `GET`, then delete Line 400. If you are using my Line 440, Line 240 is inoperative. Next, delete Line 240 and run the program.

To jazz up the pulsating boxes, change 4,4 in lines 230, 250 and 260 to 2,4. Then run the program.

Sooner or later we have to face up to centering our design. We can attack this problem two ways. First we can go through the `PUT`s and add to each pair of starting and ending coordinates +28, -6. The other, more interesting way is to use the *x,y* ploy, then type in the line `605 X=128:Y=96`. Line 640 begins with the starting coordinates at the point of origin of both the graphics element and the entire design. You may want to use it as a point of reference. All `PUT` statements using `C` and `D` are 8-by-12; all `PUT` statements using `Q` and `S` are 4-by-12; all `PUT` statements using `R` and `T` are 8-by-6. Work them out without looking at Listing 2. Reorient `DRAW` lines 685 and 810. You'll find it to be a routine task and a pleasant challenge. Then run the program to make sure all is well.

Mask Line 600. Type in Line 601 unmasked, then run the program. I'll bet you never anticipated this design!

Mask Line 601. Type in Line 602 unmasked, then run the program. Next mask Line 602, type in Line 603 unmasked, then run the program. I like it! Unmask Line 765 for a variant, then run the program.

The `SCREEN7,1` is CoCo's attempt to drive you nuts. It is harmless but necessary.

Now go back and unmask lines 600 through 602. Mask 765 and run the program after masking lines 601 through 603. It's time to `CSAVE` you-know-what.

It is also time to inspect the pulsating design. Should we add more routines? Should we enlarge it by adding more elements? This is a matter of judgment.

I see it as a complete entity that makes a statement. More elements can be added, but we are on the threshold of either an artistic statement or a mass of writhing junk. In other words, there is a time to stop and say, "This is it!"

This is not to say that we dare not continue experimenting. Change lines 650 through 690 to end in `OR`, then run the program. This variation gives a deliberate push outward from the center. Unmask Line 765, then run the program. The dots are added for accent. Practically any judicious alteration you make gives you some new variation. Change lines 650 through 680 to end in `NOT`, then run the program. For a bit more animation, mask Line 765, then run the program.

To see what happens, list lines 610 through 640, copy into lines 725 through 728 (except to end in `PRESET`), then run the program. It is a little too much. It slides across the threshold, changing from elegant to rococo. Do you see the subtle shift? Impressive but visually too ornate and confusing. Type in the line `724 GOTO730` to bypass this option.

Type in the line `200 DRAW"C1"`, then run the program. Why do we always get neat designs no matter what we do? The secret is a well-balanced design. Next, delete Line 200.

How is your imagination? For a tour de force, key in the line:

```
604 SCREEN6:PMODE3:PCLS6:PMODE2
```

then run the program. I call it *Pair of Turtles in a Big Rush*. Retype the line:

```
604 SCREEN2:PCLS0:PMODE0
```

and run the program again. This one is called *Three-Eyed Martial Yak-Yakking*.

Mask lines 685 and 810, changing `Y` to 45 in Line 605. Retype the line:

```
604 PMODE2:PCLS1:PMODE3:SCREEN4
```

and run the program. It is entitled *Opposing Armies Maneuvering*.

Change `Y` to 182 in Line 605, retype the line:

```
604 SCREEN8:PCLS2:PMODE1:PCLS3
```

and run the program. I call it *Martian Voyeur Behind Wall*.

Finally change Line 605 back to `Y=96` and retype the line:

```
604SCREEN2:PMODE1:PCLS3:PMODE3
```

then run the program. You guessed it! I made a mistake and typed in `PCLSC3` instead of `PCLS3`. Now you make the mistake and run the program. CoCo is driving me up the wall, but it is fun. If you have a yen, you can `CSAVE` any of the pictures (sic) for posterity.

Delete Line 604. Is Line 600 unmasked? Run the program. Do you have the pulsating design with the center elements and accent removed? If not, remove them on your own. Here is a project. Reposition four mating elements as close as possible, to the point of origin at *x,y*. Then bring the other four in as close as is feasible. Depending on which four mating units you pull in first, the resultant design is apt to be different. Take it from there and create a goodie, then `CSAVE` a copy, which is Listing 3.

Do you wonder about all those oddball screens (`SCREEN7`, for example)? CoCo is trying to impress you. They all translate to `SCREEN1,0`.

When you are using `GET`/`PUT` to explore or create some design, use the *x,y* system rather than numbered pairs of coordinates. Inevitably you move them about the screen. By changing *x* or *y*, you move the entire design in one fell swoop. Line 685 and 810 should have been converted to *x,y* coordinates, but we cover that later on. Use numerical offsets for now.

I call this *in-place animation*. We have given it the appearance of motion. All we did was quickly substitute images in eight or 12 locations. The accent ticks in the center alternate because it is separated physically in the program by lines 610 through 640, a part of each one of the four creating the blank area.

Here is one bonus variation: Use Listing 3. Mask lines 724, 765 and 810, then end lines 725 through 728 in `NOT`. Type in the line:

```
604 SCREEN6:PMODE3:PCLS6:PMODE2
```

then run the program. The turtle is double-timing.

There is just no end to the number of variations you can develop. It seems one variation begets another. You must agree that working with graphics is both gratifying and habit-forming. ☐

16K Extended

☑

250	109
660	81
760	55
END	16

Listing 1: `LISTING1`

```
0 'LISTING1
2 DIM A(2),C(2),D(2),Q(2),R(2),S
(2),T(2)
10 PMODE3,1:PCLS
200 DRAW"BM40,0R8D6NL8BD6BL8BU6U
6":PAINT(46,2),4,4
210 DRAW"BM20,0R4ND12BR4BD6NL8D6
L4BL4BU6U6":PAINT(22,2),4,4:PAIN
T(26,8),4,4
220 DRAW"BM30,0BR4R4D6NL8BD6BL4N
U12L4U6BU6":PAINT(36,2),4,4:PAIN
T(32,10),4,4
230 DRAW"BM100,0R4D6NL4BD6BL4BU6
U6":PAINT(102,2),4,4
240 DRAW"BM110,0R4ND6BR4BD6BL4L4
U6":PAINT(112,2),4,4
250 DRAW"BM120,0BR4BD6NL4D6L4U6B
U6":PAINT(122,8),4,4
260 DRAW"BM130,0BR4ND6R4D6L4BL4B
```

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```
U6":PAINT(136,2),4,4
400 GET(40,0)-(48,12),A,G
410 GET(20,0)-(28,12),D,G
420 GET(30,0)-(38,12),C,G
430 GET(100,0)-(104,12),Q,G
440 GET(100,0)-(108,6),R,G
450 GET(120,0)-(124,12),S,G
460 GET(130,0)-(138,6),T,G
600 PCLS:SCREEN1,0
610 PUT(100,90)-(108,102),D,PSET
620 PUT(92,90)-(100,102),C,PSET
630 PUT(92,102)-(100,114),D,PSET
640 PUT(100,102)-(108,114),C,PSE
T
650 PUT(98,70)-(102,82),Q,PSET
660 PUT(98,122)-(102,134),S,PSET
670 PUT(76,100)-(84,106),R,PSET
680 PUT(116,100)-(124,106),T,PSE
T
685 DRAW"BM100,100D4"
690 PUT(84,78)-(92,90),D,PSET
700 PUT(108,78)-(116,90),C,PSET
710 PUT(108,114)-(116,126),D,PSE
T
720 PUT(84,114)-(92,126),C,PSET
730 PUT(98,70)-(102,82),Q,PRESET
740 PUT(98,122)-(102,134),S,PRES
ET
750 PUT(76,100)-(84,106),R,PRESE
T
760 PUT(116,100)-(124,106),T,PRE
SET
765 'GOTO810
770 PUT(84,78)-(92,90),D,NOT
780 PUT(108,78)-(116,90),C,NOT
790 PUT(108,114)-(116,126),D,NOT
800 PUT(84,114)-(92,126),C,NOT
810 DRAW"BM100,98D8"
820 FOR Z=1TO40:NEXT
830 GOTO610
1000 GOTO1000
```

400 .... **28**
650 .... **148**
730 .... **138**
770 .... **82**
END **53**

Listing 2: LISTING2

```
0 'LISTING2
2 DIM A(2),C(2),D(2),Q(2),R(2),S
(2),T(2)
10  PMODE3,1:PCLS
210  DRAW"BM20,0R4ND12BR4BD6NL8D6
L4BL4BU6U6":PAINT(22,2):PAINT(26
,8)
220  DRAW"BM30,0BR4R4D6NL8BD6BL4N
U12L4U6BU6":PAINT(36,2):PAINT(32
,10)
230  DRAW"BM100,0R4D6NL4BD6BL4BU6
U6":PAINT(102,2),2,4
250  DRAW"BM120,0BR4BD6NL4D6L4U6B
U6":PAINT(122,8),2,4
260  DRAW"BM130,0BR4ND6R4D6L4BL4B
U6":PAINT(136,2),2,4
400 GET(40,0)-(48,12),A,G
410 GET(20,0)-(28,12),D,G
420 GET(30,0)-(38,12),C,G
430 GET(100,0)-(104,12),Q,G
440 GET(100,0)-(108,6),R,G
450 GET(120,0)-(124,12),S,G
460   GET(130,0)-(138,6),T,G
600   PCLS:SCREEN1,0
601  'PCLS2:PMODE4:SCREEN3,1
602   'PCLS2:PMODE4:SCREEN3,0
603   'PCLS0:PMODE4:SCREEN7,1
605  X=128:Y=96
610 PUT(X,Y-12)-(X+8,Y),D,PSET
620 PUT(X-8,Y-12)-(X,Y),C,PSET
630  PUT(X-8,Y)-(X,Y+12),D,PSET
640  PUT(X,Y)-(X+8,Y+12),C,PSET
650  PUT(X-2,Y-30)-(X+2,Y-18),Q,P
SET
660  PUT(X-2,Y+20)-(X+2,Y+32),S,P
SET
670 PUT(X-24,Y-2)-(X-16,Y+4),R,P
SET
680  PUT(X+16,Y-2)-(X+24,Y+4),T,P
SET
685 DRAW"BM128,94D4"
690  PUT(X-16,Y-24)-(X-8,Y-12),D,
PSET
700 PUT(X+8,Y-24)-(X+16,Y-12),C,
PSET
710 PUT(X+8,Y+12)-(X+16,Y+24),D,
PSET
720 PUT(X-16,Y+12)-(X-8,Y+24),C,
PSET
730 PUT(X-2,Y-30)-(X+2,Y-18),Q,P
RESET
740  PUT(X-2,Y+20)-(X+2,Y+32),S,P
RESET
750  PUT(X-24,Y-2)-(X-16,Y+4),R,P
RESET
760  PUT(X+16,Y-2)-(X+24,Y+4),T,P
RESET
765  'GOTO810
770  PUT(X-16,Y-24)-(X-8,Y-12),D,
NOT
780  PUT(X+8,Y-24)-(X+16,Y-12),C,
NOT
790  PUT(X+8,Y+12)-(X+16,Y+24),D,
NOT
800  PUT(X-16,Y+12)-(X-8,Y+24),C,
NOT
810  DRAW"BM128,92D8"
820 FOR Z=1TO40:NEXT
830 GOTO610
1000 GOTO1000
```

410 .... **54**
670 .... **78**
727 .... **117**
760 .... **97**
END **85**

Listing 3: LISTING3

```
0 'LISTING3
2 DIM C(2),D(2),Q(2),R(2),S(2),T
(2)
10 PMODE3,1:PCLS
210 DRAW"BM20,0R4ND12BR4BD6NL8D6
L4BL4BU6U6":PAINT(22,2):PAINT(26
,8)
220 DRAW"BM30,0BR4R4D6NL8BD6BL4N
U12L4U6BU6":PAINT(36,2):PAINT(32
,10)
230 DRAW"BM100,0R4D6NL4BD6BL4BU6
U6":PAINT(102,2),2,4
250 DRAW"BM120,0BR4BD6NL4D6L4U6B
U6":PAINT(122,8),2,4
260 DRAW"BM130,0BR4ND6R4D6L4BL4B
U6":PAINT(136,2),2,4
410 GET(20,0)-(28,12),D,G
420 GET(30,0)-(38,12),C,G
430 GET(100,0)-(104,12),Q,G
440 GET(100,0)-(108,6),R,G
450 GET(120,0)-(124,12),S,G
460 GET(130,0)-(138,6),T,G
600 PCLS:SCREEN1,0
601 'PCLS2:PMODE4:SCREEN3,1
602 'PCLS2:PMODE4:SCREEN3,0
603 'PCLS1:PMODE4:SCREEN7,1
605 X=128:Y=96
610 PUT(X,Y-12)-(X+8,Y),D,AND
620 PUT(X-8,Y-12)-(X,Y),C,AND
630 PUT(X-8,Y)-(X,Y+12),D,AND
640 PUT(X,Y)-(X+8,Y+12),C,AND
650 PUT(X-2,Y-30)-(X+2,Y-18),Q,N
OT
660 PUT(X-2,Y+20)-(X+2,Y+32),S,N
OT
670 PUT(X-24,Y-2)-(X-16,Y+4),R,N
OT
680 PUT(X+16,Y-2)-(X+24,Y+4),T,N
OT
685 'DRAW"BM128,94D4"
690 PUT(X-16,Y-24)-(X-8,Y-12),D,
PSET
700 PUT(X+8,Y-24)-(X+16,Y-12),C,
PSET
710 PUT(X+8,Y+12)-(X+16,Y+24),D,
PSET
720 PUT(X-16,Y+12)-(X-8,Y+24),C,
PSET
724 GOTO730
725 PUT(X,Y-12)-(X+8,Y),D,PRESET
726 PUT(X-8,Y-12)-(X,Y),C,PRESET
727 PUT(X-8,Y)-(X,Y+12),D,PRESET
728 PUT(X,Y)-(X+8,Y+12),C,PRESET
730 PUT(X-2,Y-30)-(X+2,Y-18),Q,P
RESET
740 PUT(X-2,Y+20)-(X+2,Y+32),S,P
RESET
750 PUT(X-24,Y-2)-(X-16,Y+4),R,P
RESET
760 PUT(X+16,Y-2)-(X+24,Y+4),T,P
RESET
765 GOTO810
770 PUT(X-16,Y-24)-(X-8,Y-12),D,
NOT
780 PUT(X+8,Y-24)-(X+16,Y-12),C,
NOT
790 PUT(X+8,Y+12)-(X+16,Y+24),D,
NOT
800 PUT(X-16,Y+12)-(X-8,Y+24),C,
NOT
810 'DRAW"BM128,92D8"
820 FOR Z=1TO40:NEXT
830 GOTO610
1000 GOTO1000
```

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	GR8	H3	U8	GA8
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Hardware CoCo 1, 2 & 3

Eagle Keyboard and Interface — Touch the Eagle

When asked to review the Eagle keyboard and interface, I was very excited. I have wanted to drive one around the block for quite some time now, and this was my opportunity to try one out. That afternoon I rushed home with the package, anxious to get it installed. (Of course the fact that it was a Friday could have had something to do with it as well.)

A short while later at my apartment building, I quickly zipped in the door, threw on the lights, and dropped everything on the kitchen table. Clearing out a path through the yet-unpacked boxes, I finally reached my destination, disconnected the CoCo and gently carried it to the kitchen table, clearing off a work area. Unpacking the Eagle keyboard and interface, I noticed that it was packaged very well and should withstand the normal pressures of shipping across the country.

The documentation, however, leaves a little to be desired. It was originally printed on a dot-matrix printer, and the photocopy supplied is a little difficult to read. The documentation does not specify which of the three wires is ground and which is positive. However, I didn't have much trouble figuring it out. The ground wire has a large uninsulated alligator clip, and the positive wire has an alligator clip with red insulation.

A few days later I received an updated version of the documentation that is much better than the original. It is much easier to read and provides a very simple twelve-step installation guide. The new documentation explains how to install the interface using the alligator clips to verify that the keyboard works properly. When you are certain the keyboard works, you are told to remove the alligator clips and solder the three wires to the motherboard.

The guys at Arizona Small Computers also threw in a little humor in the documentation. Instead of saying, "You may damage the CoCo," they say, "We all know it is smoke that makes these circuits work. We know this because when we let the smoke out of an electronic device, it no longer works."

Installation is straightforward and should be easy for the novice. However, I did have two minor problems. Getting the mylar cable connected into the keyboard socket requires a steady hand to ensure the pins are centered in the connector. I suggest that you examine it twice before powering up, just to make sure none of the pins are touching other pins. Also, you will notice that the plastic post in the center is in the way and doesn't allow the interface board to lay flat. If you are installing the keyboard interface permanently, you may want to remove that post with a pair of snips. This way you can install the old keyboard to fill the large hole in your CoCo.

A	AUDIO	B	BACKUP
C	COPY	D	DATA
E	EDIT	F	FREE
G	GOTO	H	HEX$(
I	INPUT	J	JOYSTK(
K	KILL	L	LOAD"
M	MID$(	N	NEW
O	OPEN	P	PMODE
Q	EXEC	R	RENAME"
S	SAVE	T	TIMER
U	UNLOAD	V	Display Version

Table 1: Enhanced Key Definitions for BASIC

Ah, now on to the fun. Putting the CoCo back together, I gently carried it back to the computer desk and powered it up. The following menu was on the screen:

```
(1.) OS9 L1
(2.) OS9 L2
(3.) EXIT TO BASIC
(4.) OS9 RUN "BOOT"
(5.) BASIC RUN "BOOT"
```

The first option configures the keyboard for OS-9 Level 1, and the second option configures the keyboard for OS-9 Level 2. Both automatically issue a `DOS` command to boot OS-9. The third option configures the keyboard for BASIC and exits to BASIC. For those without the `DOS` command, Option 4 configures the keyboard for OS-9 Level 1 and then issues the `RUN "*"` command to boot OS-9 Level 1. Option 5 configures the keyboard for BASIC and then issues the `RUN "BOOT"` command so you may automatically load any disk utility. If you don't press a key for five seconds, Option 2 is automatically selected.

According to the documentation, you can press the space bar upon power-up to bypass this menu. This is especially useful if you are using an auto-boot EPROM with such products as Disk Master, Burke & Burke, Eliminator, etc. Out of curiosity I installed the Eliminator, and the system immediately booted into OS-9 Level 2 with the keyboard configured for OS-9.

The keyboard offers a very useful shorthand method of entering commands by pressing and releasing the ENHANCE key followed by an alphanumeric key. Under BASIC the enhanced keys are defined as shown in Table 1.

Also, the (SCROLL LOCK) key emulates SHIFT-@ to pause the screen any time it is pressed. Unfortunately, it doesn't function the same under OS-9. As a handy addition for BASIC users, you can press ENHANCE-4 and have automatic key repeat.

The enhanced key definitions for OS-9 are shown in Table 2.

You can define the function keys F17 through F24 to contain anything you desire. The only limitation is that the total number of characters in F17 through F24 cannot exceed 60 characters. If you have Kevin Darling's `SCF` patches to allow line editing, the INS and DEL keys function the same as CTRL-right arrow and CTRL-left arrow. The F1 and F2 keys on the keyboard function the same as the F1 and F2 keys on the CoCo keyboard, and F3 through F24 are the same as ALT-A through ALT-V unless you redefine them.

A	Attr	B	Backup
C	Copy	D	Display
E	Echo	F	Format
G	Free	H	Help
I	Ident	K	Kill
L	Load	M	MakDir
N	MonType	O	OS9Gen
P	Procs	R	Rename
S	Save	T	TMode
U	Unlink	V	Display Version
W	WCreate	X	XMode
Z	Deiniz		

Table 2: Enhanced Key Definitions for OS-9

If there is a single option to the keyboard that really stands out above any other, it is the CTRL-ALT-DEL key combination. When these three keys are pressed simultaneously, the system performs a complete reset exactly as if you had pressed the Reset button.

Overall I like the keyboard, but it does have a few quirks. Its approximately 124 keys, which are scrunched into the same space as an enhanced 101-key keyboard, will take a little time to get used to. I really like the two distinct "feels" of the keys. For touch typists, the stroke is so light that you can almost breathe on the keys to press them — which I can really get into. If you don't care for a light stroke, you can press a key down approximately one-eighth inch to get a firmer stroke, which I think is a nice touch.

Being used to a Chicony enhanced 101-key keyboard, I find the layout of the Eagle keyboard a little cramped, but it does have some nice features. Even so, I have become quite accustomed to the layout of the Eagle keyboard. Best of all, it has allowed me to move my CoCo out of the way.

(Arizona Small Computer Peripherals, 930 W. 23rd St., Tempe, AZ 85282, 602-829-8028; $125 plus $8 S/H)

— Greg Law

Software CoCo 3

Data Form III— CoCo 3 Database Management

If you have a lot of information to manipulate, give *Data Form III* a look. *Data Form III* is a database manager that allows a maximum of 17 fields per file and up to 249 spaces for each field. It creates new database programs from the information you supply, i.e., the names of the fields and their lengths. This new program is then stored on a blank disk, along with the information you later enter into it. You can enter up to 1000 characters for each record in the file.

The program comes on a non-protected disk and the user is encouraged to make a backup copy for his/her use. Because it is written in BASIC, it runs more slowly than would a machine language equivalent. However, because it is in BASIC, it is easily modified. The disk comes with an informative manual/tutorial that describes not only how to use the program, but also discusses databases in general. The program is very "E.Z." and user-*friendly*.

The program is set up to work only with blank, formatted 35-track disks for data. You'll need a blank, formatted floppy disk for each database you create. *Data Form III* works best with two or more drives, so you don't have to swap disks; however, one floppy drive will work too.

Data Form III works fine with a RAM disk installed, which greatly speeds up sorting and searching. However, if you use a RAM disk, you must be certain that you back up the file before quitting. When you choose the Quit option, the computer does a cold start.

Data Form III works with *ADOS* as well as with Disk BASIC, and it features automatic upper- and lowercase letters for text entry into your file. The user can make backups of data while in the program.

The Organize (sorting) command manipulates the information on the disk using only your original file, rather than creating another indexed file. This way, more information can be stored on the disk. As you can imagine, there is a lot of disk access during sorts. A large database can take a while to sort. Hopefully you won't need to do it often! The results display onscreen as the sorting takes place. One of my pet peeves has always been that computers don't sort numbers "correctly." *Data Form III* does! For instance, *3* comes before *14*.

Searches must be performed for exact matches. For example, if you know the word *Computer* is in your file, you must search for *Computer*, not *computer*. However, you could search for *Com* and find *Computer*. Searches can be on a particular field or the entire database.

The screen is an attractive blue, with light-colored text. You can choose either a 40- or 80-column display.

If you decide to print all your files, the printout includes the names of the fields as well as your input data. There is a menu choice to change your printer's baud rate. *Data Form III* also prints labels — standard five-line labels or non-standard labels. However, you can't input the quantity of a particular label you want to print.

A short, sample database, which the user can type in, is included in the manual. There is room for 471 files on the disk using this tutorial as an example. It includes nine fields with 308 characters.

I set up a name and address file consisting of Last Name (with a maximum of 15 characters), First Name (10 characters), Street (20 characters), City (15 letters), State (15 letters), ZIP Code (10 characters), Telephone Number (15 characters), Birthday (17 characters), and Anniversary (17 characters) for a total of 134 characters. The program informed me there was room on my disk for 1305 files.

There is no warning when you reach the maximum number of characters allowed in a field. The program just cuts off any extra letters or numbers.

Data Form III is a good choice for the Color Computer 3 user who has a lot of information to store. It devotes an entire disk for each database the user creates.

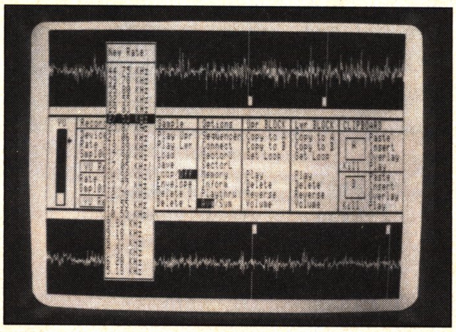
(E.Z. Friendly Software, 118 Corlies Ave., Poughkeepsie, NY 12601, 914-485-8150; $19.95 plus $1.50 S/H)

—Lee Deuell

Software CoCo 1, 2 & 3

Studio Works— A Sound Studio in 512K

Inside a soundproof studio you listen to the din of a rush-hour crowd emanating from Cerwin Vega speakers. Sidewalk vendors hawk their wares at passing pedestrians. You wince as tires screech to an abrupt halt. Then suddenly you are transported to a place where water laps onto the shore and gulls circle overhead. In the distance, barely audible, the fading echoes of police sirens are drowned out by a crashing wave.



These sounds and more can all be saved to disk using Oblique Triad's astonishing program *Studio Works* — a digital sound editing system for the CoCo 3. Requirements include a CoCo 3 (512K is recommended to fully explore the capabilities of this package), disk drive, standard joystick or mouse, and a sound source adapter cable. The cable can be ordered with the package, or you can choose to build one using the schematic in the manual. A *Maxsound* cable works, also.

A digital sound editing system allows you to sample (record) audio signals and rearrange them by cutting, pasting, dubbing, overlaying, reversing and changing the sampling rates (speed) originally set when capturing the sounds.

I got *Studio Works* up and running with a couple of samples captured in a few minutes' time. The cable to record sound connects to the left joystick port and to any sound source with a 1/8-inch phone jack output. With the purchase of a connection adapter available at most electronics parts stores, the 1/8-inch end can be adapted to receive output from other sources or stereos with RCA jacks.

Capturing a sample is easy and can be accomplished on the main screen where sample waveforms are displayed and editing is performed. Use your joystick or mouse to select a sound source, recorded or live. Next make proper volume adjustments on the displayed VU meter and click to select one of two recording functions. If you do not reclick or release the recording function, the sample continues recording until available memory is consumed.

Once you have a sample in memory, the fun begins. I had friends laughing when I sampled their voices — then sped up the sampling rate until they sounded like frenzied chipmunks. If you're looking for hidden messages on records, stop wearing out your stylus: Sample the measures in question, reverse the sample and then sit back and realize how much time you've been wasting.

To recreate my opening scenario, take a portable cassette recorder to a busy street, tape five or 10 minutes' worth of action, then repeat the same process at the beach. Bring the tape home and sample the best sections of tape. Two samples can be viewed for simultaneous editing. Load your beach sample into the upper editing block, then block the desired section of sample and copy it to clipboard A or B. Next load your city sample into the lower editing block and set the lower editing block markers where you want to paste the beach sample, which still rests in the clipboard. Select the clipboard where your beach block is located and click the Paste option.

The act of pasting erases or records over underlying sections of sample. The cursor changes from an arrow to the letter P. Using a joystick or mouse, move this P inside your blocked section of city sample and click. Your beach sample has now been edited into the city sample. You have finished with the upper editing block containing the beach sample.

Next, block and copy a distinct sound from the city sample into the vacant clipboard. Block the latter beach sample section and choose the Overlay option to retrieve the city sample in the clipboard. The cursor changes to an O. Move this cursor inside the blocked beach sample and click. Repeat these overlay steps, moving the cursor a little to the right each time. The result is an echo of city sounds over beach sounds. *Voila*, your new sound creation is complete.

The possibilities are vast. Programmers

Jeff Noyle and Dave Triggerson have developed a very user-friendly program. With the exception of typing in sample names, all functions are executed via clicking and dragging. Saving samples to disk or storing them in memory using the sample archives is a cinch. The disk drive is not accessed when using the archives, which keeps sample swapping to a minimum. Samples can be quite large, sometimes requiring over 68 granules of disk storage space. Sample files have managed to nudge their way past Hi-Res graphics in the memory hog trough. Fifty-six 8K blocks are available for memory storage when using a 512K CoCo.

When at the sample archive screen, each file can be played by pressing the designated key. If you want to hear all samples played consecutively, a sequencer option is supplied.

Two of the most useful features in this package are the options to save samples for use with BASIC or machine language programs. Programming directions are in the manual, explaining how to incorporate your samples into other programs. An example of this feature is in the opening segment in Oblique Triad's new graphics adventure game, *The Seventh Link*.

I found *Studio Works* a delight and commend its development. Musician friends have gazed over my shoulder, envious of a 30-second sample. Oblique Triad is establishing itself as an innovative company in the CoCo Community. Give this program serious consideration as an addition to your CoCo library.

(Oblique Triad, 32 Church St., Georgetown, ON L7G 2A7, Canada, 416-877-8149; $54.95 U.S. or $64 Cnd. with cable; $39 U.S. or $49 Cnd. without cable)

—Tony Olive

Software OS-9

File System Repack— Disk Defragmenter

After setting up a hard drive, your first inclination is to load it up with everything but the kitchen sink. However, managing a hard drive is quite different from using floppy disks. One of the major problems with any disk — hard or floppy — is what is known as disk fragmentation, or, in other words, inefficiencies that develop in the way files are stored on the disk, such that the disk drive has to work harder (and longer) to retrieve a file.

As an example, suppose I start up my favorite word processor (*DynaStar*) and begin typing this review. Let's say I complete half of it tonight. When saved to disk the file takes up 10 sectors of space; OS-9 finds 10 sectors and saves the file. The next night I write another 10 sectors of review, and when it is saved OS-9 must look for 10 additional sectors somewhere on the disk — and these are probably not contiguous with the first 10 sectors. A file stored in this manner is called a fragmented file.

So what, you say? Well, one result is that the disk head must move around the disk to read these groups of sectors, obviously causing more wear and tear on the drive and lengthening the time it takes to load the file. Magnify this many times along with file deletions, and before you know it there are parts of files all over the disk. Now, I know this is an oversimplified view of fragmentation (I can hear the purists rolling on the floor with laughter); but you can read about the technical details in a number of articles, some of which are noted in *File System Repack*'s manual.

File System Repack is a collection of disk utilities from Burke & Burke that help you maintain a healthy disk system. Although they work on both floppies and hard

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drives, *File System Repack*'s utilities are meant primarily for hard drives. The utilities contained in the package provide the user with the tools needed to reduce or eliminate fragmentation:

`HDB` and `HDR` — hard disk backup and restore, respectively.

`CCheck` — scans a disk for defective sectors and identifies any files stored in defective areas of the disk.

`Stash` — marks files or directories that should not be repacked. `STASH` can also be used as a security tool to hide files.

`Zap` — erases a file's directory entry without deallocating sectors.

`Repack` — optimizes a hard disk by merging file segments and reorganizing disk storage.

`BA` — sets allocation bit map bits for a specified Logical Sector Number (LSN) or for a range of LSNs.

`BD` — clears allocation bit map bits for a specified LSN or for a range of LSNs.

In addition to the above utilities you need `DCheck` from the OS-9 system disk.

To repack a disk there are three basic steps to follow as outlined in *File System Repack*'s documentation:

```
dcheck -bp /h0
ccheck -ap /h0
repack /h0
```

With such a simple procedure, I figured even I could follow this. Having never used `DCheck`, I didn't know what to expect and redirected output to the printer so that I would have a record.

After a bit of whirring and grinding of the disk drive, the printer came alive and printed about a page of messages followed by a final message that said, "File structure not intact!" There I sat muttering to myself (everyone else in the family thought I was crazy) — how can this be? There hadn't been any problems with the disk drive. Furthermore, the documentation says not to proceed if the above message is obtained — but it doesn't tell you what to do!

Then I looked over the messages and noticed that `DCheck` was complaining about two commands that are in both `/h0/CMDS` and `/h0/APPL`. It hit me — I had linked the two commands using a disk `Link` command. Anticipating this would cause a problem with `CCheck` and `Repack`, I removed the links before continuing. Rerunning `DCheck` resulted in the "File System Intact" message.

Continuing to the second step, the documentation warns that `CCheck` takes several hours to run on a 20-Meg hard drive. This is because the program "non-destructively reads and writes every sector of the hard disk, marking off bad sectors and reporting the names of files stored in bad sectors." If there are any bad files, they must be removed using the `Zap` command. On my 20-Meg hard drive `CCheck` took about 4½ hours to accomplish its task. When finished it reported "Integrity check of `/h0` passed — processed 688 files, 41 directories."

OK! — two-thirds of the way finished. Now for the big step — `Repack`. According to the manual, a half-full, badly fragmented 20-Meg hard drive can take 10 or more hours to repack. Apparently my quarter-full disk was not badly fragmented because it took only two hours to repack. It is important to note here that the limiting factor in this process is the 2 MHz 6809 and numerous reads and writes which must take place. It is not a problem with the software.

That's it! Although time-consuming, it is a simple process to repack a hard disk. The manual provided with the software is clearly written and easy to follow. Each of the commands have additional options for specific needs — or to satisfy the true hackers. For us mere mortals the above procedure gets the job done just fine. In addition, an appendix provides additional detail about the OS-9 disk file structure and fragmentation.

At about the time I received *File System Repack* for review, I had an opportunity to see a demo of a similar package for the MS-DOS operating system called *PC Tools*. One of the things that impresses me about this MS-DOS package is the graphical interface that shows the disk fragmentation and how the repacking progresses. Unfortunately, this graphics feature is not provided with `Repack`. However, I have a public domain program, `Dam` (author unknown), that graphically shows the fragmentation of the disk. I ran this program before and after using `Repack` and was pleased to see all of the disk files nicely packed on the disk after `Repack` did its work. I encourage Burke & Burke to come up with a similar utility — a picture is worth a thousand words!

Burke and Burke's *File System Repack* is an excellent package and a must for all hard drive users. Sufficient flexibility is incorporated in the utilities to meet a wide range of needs. As I noted above, the process is simple enough that novice OS-9 users should have no trouble performing disk housecleaning, even if they don't fully understand all the technical details of disk fragmentation.

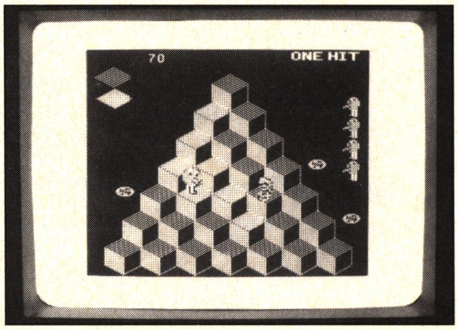
(Burke & Burke, P.O. Box 58342, Renton, WA 98058, 800-237-2409; $29.95)

—Donald Dollberg

Treasury Packs #1 and #2— The Making of a Closet Gamist

I had the devil's own time doing the reviews for *Treasury Packs #1* and *#2*. Every time I loaded a game, I'd hear a chorus of "Let me play, let me play!" It got so bad, I was turning into a closet game player. (Are the kids outside? Or in school, maybe? Good! Then I can play without anybody taking my joystick from me!)

I'm not a seasoned arcade gamist. I hate to waste quarters dying in the first screen of a game I don't know how to play. These *Treasury Packs* suited me just fine. The *Packs* are sold separately, at a price of $29.95 for each disk. Each disk is packed with favorite games (*#1* has eight games, *#2* has seven), all of which were originally marketed by Spectral Associates and sold separately for $24.95 to $28.95 at that time. Most all of these games are recognizable as arcade classics, and Microcom Software bought the rights and now distributes them in these collections. The instructions are all the original docs printed out by Spectral, and I don't really think the fact that one set is printed on pink paper and one set on blue has anything to do with who can play what games.



About the only thing I think could have been done differently is the docs for *Treasury Pack #1*. While they are all there, I feel they could have been arranged in a more organized manner. I was a bit confused on the order of the instructions and called Microcom. The people there assisted me in putting the docs in order, and I found them quite patient and willing to help. Microcom guarantees its disks to load, and if something happens to a disk while en route to you, Microcom will replace it.

I (and my children) tested all of the games on these *Treasury Packs* on a CoCo

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2, then I took them (the packs, not the kids) to our users group meeting and tested them all on a CoCo 3. Joysticks are required for most of these games but optional for some. 32K is required, except for *Roller Controller*, which is the only game programmed exclusively for a 128K or higher CoCo 3.

Now, let me break down the *Treasury Packs* and tell you a little bit about the games on each.

Treasury Pack #1

Keys of the Wizard — This is a text adventure game (there's one in each of the packs) with three different skill levels. The higher the skill level, the more treasures are hidden and the more traps are active. As you go through the mazes and wind your way among the paths, you encounter eight creatures that either try to kill you or help you. There are 32 treasures, which you must find and take to the sanctuary (hidden within one of the mazes) to win the game.

Unlike some games where you can carry everything at once, this game seems to go by weight — so the heavier the objects, the less you can carry. All the objects and creatures are randomized so a game doesn't play the same way twice.

Definitely make a map for this one, as forest floors can collapse on you, plunging you into underground caverns. You'll use commands like `READY` and `UNREADY` to prepare your weapon, `REST` to build up strength points (which diminish as the game goes on),and `QUIET`, which acts to pause the game. Oh, and don't try to quit or save a game. You have to `UNCLE` and then the game will save only to tape, even if you are using the disk version.

Lunar Lander Rover — This game is known in arcades as *Moon Patrol*. Your mission is to maneuver a lunar rover, exploring the 26 sectors mapped on the moon. Since you're on the moon, you see the earth up in the sky, and of course there are craters and boulders. There is also an alien force (the men in the moon?), trying to prevent you from completing your mission. They've planted mines in some of the sectors and shoot at you from the sky. You have to blast them, jump the craters, jump or blast the boulders, and make your way through. The graphics in this game are the full, filled-in type, not just drawn-in outlines, and it takes practice to even make it halfway through.

Cubix — This, of course, is *Q-Bert* — the little guy that jumps from block to block on the pyramid, avoiding snakes and such and definitely trying *not* to fall off the pyramid. An added bonus with this game is the sound capability if you have a Speech/Sound cartridge installed.

Module Man — The Speech/Sound package is optional in this one. As Module Man, you have to find the magic sword and return it to the king. There are 25 objects scattered throughout 15 screens, including a secret screen. The monsters (of course!) are trying to kill you as you touch or pick up these objects, and you can't get to the next screen until you've gotten all the objects *and* killed all the monsters in that screen. You really have to do some searching to find the secret doors, and some fancy running, jumping and climbing to get through this game.

Decathlon isn't a game you want to play to relieve your tension. Just as in the Olympics you participate in 10 different track and field events, not advancing to the next event until you've qualified in the previous one. The keyboard controls the player in this one.

Qiks — If you have the Speech/Sound pack, you can also use it in this game. *Qiks* is more a game of strategy than luck. You claim territory by drawing in lines with the joystick, which controls the cursor. On the screen, moving around, are sparks and a set of lines. If the sparks run into you, you die. If the set of lines runs into the line you're drawing, you die. The object is to get as much space on the screen filled in as possible. When you have 75 percent or more filled in, you move on to the next screen, with points being awarded for the amount of filled-in space.

Roller Controller — This is the only game out of the two *Treasury Packs* made exclusively for the CoCo 3, and it works with either an RGB or composite monitor (or TV set). The object is to guide the rolling marbles into the bins of the corresponding color at the bottom of the screen. To get the marbles where they are supposed to go, you have to open and close trap doors. If the marbles fall out of playing range, fans located in the bottom corners blow them back to the top of the screen. The best way to describe this game is as a cross between a pinball game and a maze.

Pengon — a.k.a. *Pengo* in the arcades. You're a little penguin playing around in the middle of a stack of ice cubes. Using the joystick, you push the ice cubes around, crushing them, or push them on top of the beasts (apparently penguin-haters) to crush them. It's simple enough, and more fun if you pretend the beasts are people you don't like very much!

Decathlon — This isn't a game you want to play to relieve your tension. Just as in the Olympics you participate in 10 different track and field events, not advancing to the next event until you've qualified in the previous one. The keyboard controls the player in this one, and you get three attempts to qualify for each. I must admit, I never made it past the shotput (Event #3). This challenging game can be played by up to four players at once. It saves only to cassette, even with the disk version.

Treasury Pack #2

Galagon — This is an arcade shoot-'em-up game that works with the Speech/Sound pack also. A joystick is required to control your spaceship. The object is to shoot all the aliens that are diving toward you, shooting as they go. The aliens start out in formation but then break out for individual attacks.

Lancer — Also known as *Joust*, this game can be played by one or two players. You are a little knight on a horse, trying to destroy the enemy with your lance. A twist to this game is that once you kill an enemy, it can resurrect into a new rider. There are lava pits to avoid, disappearing islands and, of course, a dragon to slay. It's all in a day's work for your little knight, though.

Froggie — Even a preschooler will recognize the popular *Frogger* game. Choose your weapon (joystick or keyboard) and guide your frog across the busy street and then across the pond to his home. A lady frog floats on one of the logs and she really appreciates it when you rescue her. Crocodiles, snakes and otters make your trek toward home more dangerous, and the diving turtles always want to take you underwater with them. One or two players can play this, taking turns jumping their frogs to safety. Oh, and there is a pause feature in Froggie allowing you to take a break.

Ms. Gobbler — Why, it's *Ms. Pac-Man* in disguise! This maze game (for one or two players) has you gobbling all the little food dots in your path. Eating one of the four energizer dots gives you the strength to kill the ghosts who are relentless in pursuing you as you eat. In case the ghosts gang up on you, or you've eaten everything at the bottom of the maze and need a few from the top, you can use the teleportation spot, which transports you back to the top of the screen. For those who think this game is too simple, try the "inviso-maze" option . . . you have no walls to guide you.

Ice Castles — Another one- or two-player game. Bently Bear runs through the different castles, collecting gems (they look like dots to me!) and avoiding his enemies. Moving trees, swarms of bees and the wicked witch try to stop him. Color Computer 3 players should use a composite monitor or a TV set, not an RGB monitor.

Devious — In *Devious*, you just kill everything in sight. This shoot-'em-up game is for one or two players and gives you the option of playing with the joystick only or a joystick/keyboard combination. There are ships in the air that shoot at you and resistor shields that cannot be destroyed but will destroy you. The enemy ground bases and mother ship are (where else?) on the ground. It keeps a person busy trying to shoot in two directions at once, especially if a higher skill level is chosen — where there are more air ships and all the ships fire more often with faster shots.

Madness and the Minotaur — As promised, this is the text adventure included with *Treasury Pack #2*. There's a large castle to wander around in and deadly gas that seems to follow you everywhere. General advice: Avoid the gas and the traps, collect all the treasures, and take them to the forest to win.

Considering the cost of the original games in these *Treasury Packs*, and considering their popularity, I have to recommend these two packages. Whether you're a "classic" collector or just an avid arcadist, these packages will make an excellent addition to your software library. It's like buying one and getting six or seven more for free — and you can't beat a deal like that!

(Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, 800-654-5244; $29.95 each, $3 S/H)

—Gail Allore

Software CoCo 3

Phonics Fun— Sounding It Out for Preschoolers

As the co-director of a small private school, I was pleased to receive *Phonics Fun* for review. As its advertising points out, this educational game is intended for preschool to first-grade children — a very difficult age group to write software for because children this age haven't yet developed the skills necessary to read prompts on the screen.

Phonics Fun is for the CoCo 3 with at least one disk drive; RGB or composite monitors are selectable from within the program. Although early primary children are the target users, it takes an adult to guide the child through the program at first. (This is not a criticism, just a fact.) Although I've found that the 5- and 6-year-olds at our school can be taught to turn on the equipment and load and run programs, I have yet to encounter a program for this age group that the child can operate without help the first time out.

The program is supplied on a single, nonprotected disk, which must be left in the drive during program operation. After loading and running, the user is asked to indicate monitor type and to specify whether or not instructions are necessary. After that, the title screen appears. The next screen is a menu that allows the user to select one of the four categories: farm, circus, magician or park. This menu has large numerals next to excellent pictures representing the choices. The choices are also spelled out for adults, but the child can make his or her selection without reading — hurrah! The selected background for the exercise is

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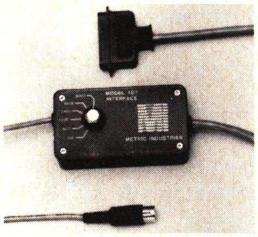

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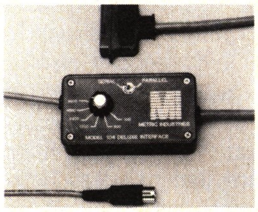

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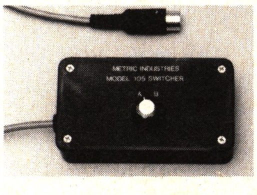

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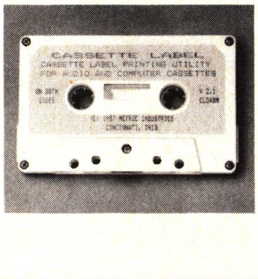
- ★ Connects to your COCO to give you 2 switch selectable Serial Ports
- ★ Comes with a 3 foot cable to connect to your computer
- ★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
- ★ Does not require power



Cassette Label Printing Program

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- ★ Menu driven, very easy to use
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- ★ Uses the features of your printer to print standard, expanded, and condensed characters
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- ★ Allows editing of label before printing
- ★ Program comes with 24 labels to get you started
- ★ 16K ECB required

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Write or call for more information or for technical assistance.

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Model 101	**35.95**
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drawn and a tune is played appropriate to that choice.

The graphics are drawn on `HSCREEN2` so that 16 colors are used and the tunes chosen for each area are clever and well-executed. Windows are then overlaid on the background in which the exercise takes place. A picture is drawn of an object one might expect to find in the chosen location in the left window, and four words appear in the right window with their initial letters highlighted. The child needs only to match the initial sound with the picture and press the appropriate letter key. If an incorrect choice is made, that word is erased and the program waits for another response. If the correct choice is made, the computer plays a short tune, and another object appears for identification.

At each point in the program where the child can make a choice, only choices shown onscreen are accepted, other keys are ignored. Each "locale" in the program has 10 objects for identification; when each has been identified the child receives a written "pat on the back" and is asked whether or not to go on to another category or end the program. Unfortunately, for a moment the program slips out of its target market and assumes the child can read the prompts. However, with adult guidance the first time or two, the child learns to answer correctly at this point.

The program is written in BASIC in six modules: one for the title and initialization, one for the menu, and one for each of the menu choices. None of these stand alone, and the program loads and reloads each module as needed. It might have been more elegant to place the pictures and choices in a data file so they would come up in a random order each time, and so the number of pictures could be added to at a later date by purchasing another picture disk. But the system works, and conceivably more pictures could be made available with another complete disk of six modules for the additional pictures.

Although the very effort of trying to add to the specialized needs of this level of educational software is to be applauded, the program does have its drawbacks. It would be a good idea for the authors of educational software to consult a teacher familiar with the target group or at least proofread their work.

Since we are concerned only with the initial sounds of the words, it is not necessary to include the whole word in the choice box — large initial letters would be easier to read. The child *does* see the word spelled out under the object after making a correct choice.

Since this program is basically an interactive ABCs book, it would have been nice if it had included an object beginning with every letter in the alphabet. There are 40 pictures available, and some letters are duplicated from section to section. Also, some words do not begin with a clearly individual letter sound but with a digraph such as *sh*, *ch* and *ai*, so there was plenty of room for all 26 letter sounds.

Some of the choices are words I would not commonly expect a child this age to be familiar with. *Pail* is one example. In this part of the country we more commonly call the item in question a bucket, but this may be a regional peculiarity. More serious is the expectation of the child to identify a skateboard as a *skate* and a ferris wheel as a *ferris*. Admittedly the initial letter is the deciding factor, but when the word appears under the object, it seems desirable to have the whole compound word appear.

Some misspellings were noted, an undesirable flaw in educational programs; and a few pictures were not readily identifiable by children who tested the game, but a phone call to the author brought reassurance that future copies of the program would have these corrected.

In spite of the drawbacks mentioned, and in light of the shortage of educational programs of any kind for the preschool to first-grade level, I feel that at the asking price of $15 this would be a valuable addition to the software library of anyone who has or works with children in this age group. A child of this age will play it again and again for a chance to look at the pictures and hear the tunes.

(W.B.D. Software, P.O. Box 1077, Esterhazy, SK S0A 0X0, Canada, 306-745-6527; $17 U.S. plus $2 S/H)

—Richard Gordley

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Software CoCo 3

Supersound— Digitized Sounds for BASIC Programs

Did you know that a computer can act as a "digital" tape recorder — converting natural sounds you hear into digitized data the computer can understand? Digitized sounds can be stored in memory, played back and manipulated just like any other kind of numerical data. *Supersound* is a software sound digitizer that turns a CoCo 3 into just such a digital recorder.

You'll learn what *Supersound* is all about by running the demo program that comes with the package: First there is a *CoCo Max III* picture of a chugging steam engine (with animated puffs of smoke and rolling wheels and rails); accompanying the picture we hear the realistic digitized sound of a moving train. Next we see another *CoCo Max III* picture of an animated reel-to-reel tape recorder and hear a selection from a perky Sousa marching tune. Suddenly the tape recorder switches to fast forward and so does the music! Then we hear the music played backward, then forward again but very slowly this time, and so on.

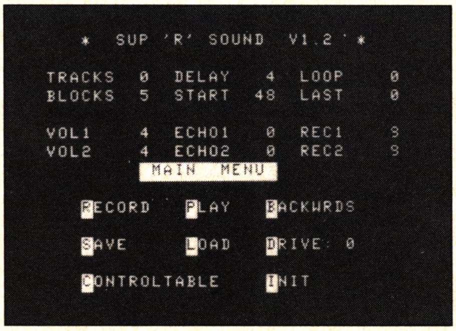
Supersound allows sounds lasting from a few seconds to several minutes to be recorded (digitized) into a CoCo 3, played back and saved to disk. There are special effects that can be applied to the digitized sounds that mimic features found on professional tape recorders. If you program in Disk Extended BASIC, *Supersound* offers a method for adding your digitized sounds to BASIC programs, and you can also add sounds to *CoCo Max III* pictures with sound and animation occurring simultaneously.

Supersound comes on a single, unprotected disk, operates under Disk BASIC and includes a seven-page, photocopied manual. The manual states that the program should also work with most other CoCo DOS products. System requirements include a CoCo 3 with a minimum of 128K of RAM and a disk drive. Sound is entered into the CoCo with an included cable that connects between a standard earphone jack and the right joystick port, so you'll need a sound source that has a 1/8-inch earphone output, such as a cassette tape recorder, radio or TV. If you want to digitize your own sounds (your voice, for example), you need a tape recorder. *Supersound* can take advantage of extra memory — up to 512K for digitizing and storing longer sound sequences.

Supersound operates in the 32-column screen with buff letters on a black background. The program is written partly in machine language and partly in BASIC. Like a BASIC program, *Supersound* can be halted (except when playing a sound) by a press of the BREAK key, and can be restarted by typing RUN. If you're familiar with programming, you can edit the screen width and colors to your liking (in fact, the manual encourages you to edit the BASIC drivers to your liking).

To digitize your first sound, you need to have either a prerecorded sound ready to go, or have a tape recorder that allows you to monitor live input through the microphone (in *record-pause* mode, for example). Single-key commands from the main menu initiate the real-time recording/digitizing process. You first enter a "monitor" mode where you can actually hear the digitized sound through the monitor speaker or audio jack of the CoCo 3. Here you can adjust the input volume of your sound source and preview the digitized sound. When you're ready to record, press the space bar. The recording process begins and continues until either the space bar is pressed again or the allotted memory is used up.

Once recorded, the digitized sound can be played back immediately. You hear it just as it sounded during the recording/digitizing process. You can now take advantage of some of *Supersound*'s special effects features. You can speed up the playback rate, making your own voice sound like a chipmunk's, or slow it down to sound like Darth Vader's. You can play it backward with obvious results, and you can add varying levels of reverb to your sound. When you've set playback rate, reverb and other effects to your liking, you can save the sound to disk with all settings intact.



```
      *  SUP 'R' SOUND   V1.2 '*

  TRACKS   0  DELAY    4  LOOP     0
  BLOCKS   5  START   48  LAST     0

  VOL1     4  ECHO1    0  REC1     9
  VOL2     4  ECHO2    0  REC2     9
            MAIN  MENU

     RECORD   PLAY     BACKWRDS

     SAVE     LOAD     DRIVE: 0

     CONTROLTABLE      INIT
```

Once saved to disk, a sound can be loaded and played back at any time with *Supersound* (be advised that if you recorded a sound to the full capacity of a 512K CoCo, several disks would be required to store all the sound data). *Supersound* files can also be accessed directly, in conjunction with the machine language utilities provided, for use with your own BASIC programs or *CoCo Max* pictures.

As you become more experienced with *Supersound* you can make use of some of its more advanced features. The "sampling" rate (that is, the resolution/fidelity of the digitized sample) can be set to any of 255 settings, where 0 represents the fastest sampling rate. The faster the sampling rate, the higher the fidelity of the sound and consequently the less recording time available per unit of memory. Six seconds of sound at highest fidelity consumes 40K of memory, while the same six seconds at a more modest sampling rate uses only 20K.

One limitation is that if you record a sound at the fastest sampling rate, it cannot be played back at a speed faster than the one at which it was recorded. I found a rate of 12 to be acceptable for most applications. A 128K CoCo can store about nine seconds of sound at highest fidelity, while a 512K CoCo can store over a minute of the same.

If you're willing to trade a little more fidelity for some extra versatility, *Supersound* can act as a two-track recorder, allowing you to record a sound first to one track and then record a new sound to the second track while monitoring the first.

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Both tracks can then be played back together and effects such as volume and reverb can be adjusted individually for each track. This makes for neat effects!

Supersound also gives you control over just where and how much memory is to be allocated to your recording. Sound is stored in 8K blocks, and the starting and ending blocks of memory to be used can be defined prior to digitizing. If you're like me, your knowledge of the CoCo probably does not extend into the realm of how memory is actually managed, so the *Supersound* manual includes an easy-to-understand table of various starting and ending block number locations for storing sounds. For example, memory blocks 48 through 51 are indicated as being used by the CoCo 3 to store Hi-Res graphics screens, so if you want to use a digitized sound with a *CoCo Max* picture, you would not want to use these blocks for storing sound (though as I discovered by mistake, loading a sound into these locations while displaying an animating *CoCo Max III* picture makes for an interesting display of video noise). If you have an internal 512K upgrade, a total of 48 8K blocks of memory are available.

Some Disk Extended BASIC programming knowledge is required if you want to use *Supersound* files with your own *CoCo Max III* pictures or BASIC programs. The manual has a listing of USR calls and poke addresses (in Hex) that allows access to all of *Supersound*'s features from BASIC. While USR calls and poke functions are a little beyond my own technical knowledge, I found it easy enough to use the CoCo's built-in BASIC editor to review and edit *Supersound*'s BASIC driver and demo programs for use with my own programs. *Supersound*'s BASIC programs are short and clearly annotated. I also found generous help just a phone call away by calling the technical support number listed in the manual.

Overall, I rate the quality of the digitized sound as only fair, and I was unimpressed with the effectiveness of the reverb effect feature. I haven't had the benefit of reviewing other sound digitizers for the CoCo so I don't know how *Supersound* compares with the others, but I'm sure the greatest limitation on sound quality for any digitizing software for the CoCo is imposed by the inherent slowness of the CoCo's operating speed (*Supersound* does use the high-speed mode for better sound quality). If you want the high-quality digital sounds associated with CD and DAT players, you won't find them here, but if you *are* looking for the tools to create customized sounds that go far beyond the beeps and buzzes normally available to CoCo users, this is the program to have.

Supersound is a basic nuts 'n bolts kind of program that does all it promises to do. *Supersound* does have a bit of a "homemade" look and is not as slick a production as some other software available for the CoCo 3 (the manual, for example, is full of typographical errors), but on the other hand the program has a positive and friendly feel to it. What comes across is a program that works and is open to whatever level of expertise the user wants to bring to it. While I would not recommend *Supersound* to a raw beginner, I think this program would be of interest to the moderately experienced CoCo user who's done some BASIC programming and is interested in exploring another capability of this remarkable machine.

(Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203, 517-787-3610; $39.95 plus $2.50 for S/H)

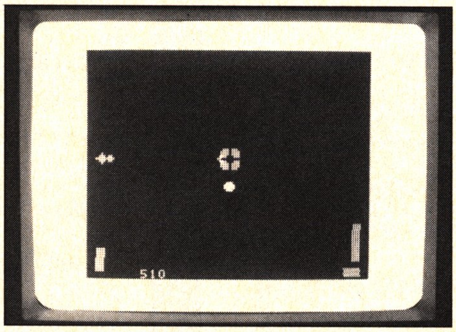
—Walter Myers

Software CoCo 1, 2 & 3

Space Pac— Blast Off and Blast the Enemy

Space Pac from Microcom is a collection of 10 machine language programs that show off the CoCo's power, featuring old favorites and games with new twists.

The collection is available on tape or disk and runs on all models of the CoCo having at least 16K of memory (except for one version of *Android Attack*, which requires 32K). The collection is not copy-protected, and it is highly recommended that the owner make backups (more on that later). Most games require one joystick, a few require both, and several can be played from the keyboard.



The documentation consists of five 8½-by-5½-inch photocopied sheets. The print is extremely small and hard to read. System requirements and loading instructions for both tape and disk are provided along with the filename, starting, ending and execution addresses for tape systems. The remainder of the documentation consists of game-specific instructions for the individual games. The information on game play is precise and adequate.

With no extra hardware required, the 32K version speaks through the TV speaker. I often thought the sound generator had the capability to vocalize, but I didn't have the machine language expertise to prove it.

I have consulted with my 9-year-old daughter, Shari, and 7-year-old son, Brian, for some of the following remarks on the individual games:

Color Zap—You are in the center of the screen. With the right joystick you fire on invaders at the four points of the compass. Rapid-fire is available so the challenge is not so much to shoot all the invaders as to prevent your laser from overheating and melting down. Brian likes the sound effects, but Shari doesn't like her laser melting all the time. The game is challenging but it becomes monotonous after a while.

Color Space Invaders—This is a familiar computer game in which waves of invaders march back and forth across the screen, dropping bombs and firing lasers at you. You're at the bottom of the screen with left and right movement. You fire back at the invaders and have a shield to protect you. The game can be played with joysticks or keyboard, but the kids recommend joysticks. The game was a bit too challenging for the children because you can have only one shot on the screen at a time, and there are very many invaders.

Planet Invasion — In this game you defend your planet's surface (the bottom of the screen) and precious crystals from attack. Control is by means of one joystick and the keyboard. This is best played with two players, one to fly the ship and man the guns while the other controls the smart bombs and the "panic button," hyperspace

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drive. The ship moves too fast for Brian — he can't keep track of it! Shari can't watch the radar screen and the ship too. I like the challenge of the immediate battle with the overall scene provided by the radar.

Space War — This is a very tough one with a lot of action. Surprisingly the kids did quite well and therefore liked this game. Both joysticks are used in game play, but you don't need the functions on the left stick to do well. You fire on the Death Star while avoiding the black hole, an enemy ship and fire from the Death Star. The action is fast and the controls are touchy, but it's a lot of fun trying to master them.

Space Race — You fly around a four-cornered race track in space, firing at aliens and dodging their missiles. Brian has this game down pat. He spent hours with the firebutton held down, bouncing off the walls in a headlong rush around the track — and scored higher than anyone else!

Galax Attack — *Galactic Attack* on the CoCo, a good rewrite of a classic. The children didn't like this one too well, but they don't like it on any other machine either!

Android Attack — The CoCo speaks! With no extra hardware required, the 32K version speaks through the TV speaker. I often thought the sound generator had the capability to vocalize, but I didn't have the machine language expertise to prove it. The voice is not top quality and is difficult to understand, but the feat itself is impressive enough that I hope other programmers take the seed and expand on it. In the game, you walk through a maze of rooms fighting androids and collecting treasure. This is relaxing after the high-pitched action of some of the other games, but it isn't wimpy. There is a 16K version of the game that plays just the same, yet lacks speech.

Whirlybird Run — I hope you have your pilot's wings for this one! You fly a chopper over hilly terrain, hunting for enemy bases and fuel depots, while firing machine guns and dropping bombs. Ground-based missiles are hunting *you*. The second screen features airborne hazards in addition to the ground-based ones. I don't know for sure what awaits after that, because we never made it past the second screen. This was the family favorite.

Space Sentry — In deep space your radar screens are your eyes. In this game there are three radar screens to watch: one tuned to react to space mines, one tuned to your refueling station's beacon, and one scanning for alien craft. The radar is hard to see, and it's difficult to distinguish echoes. Your craft is highly maneuverable and fast. You have your hands full with this one.

Storm Arrows — I've never seen one like this. You maneuver through a grid, dodging storm arrows while looking for refueling stations. You must avoid mines and keep an eye on the timer. The quicker you clear the screen, the higher the bonus points.

Space Pac presents an interesting variety of games. I am impressed with the programming. Not only is the speech a surprise, but the programmers have done some strange things with the screen (flashing colors without borders, for instance). The resolution and animation are really impressive.

My major gripe is that there is no exit from the programs. For instance, I had a disk crash after a reset before I write-protected the disk. (I recommend backing up the program.) A cold start eliminated the problem, but it's hard on the hardware to cold start after each game. If you hold the reset button for about five seconds, you get a fairly reliable restart with only an occasional conflict. *Space Pac*'s price is reasonable for the quality of the programs. It's an enjoyable break from "computing"!

(Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, 800-654-5244; $29.95)

—William Baird

Software CoCo 3

CycleJump— Breezy Rider

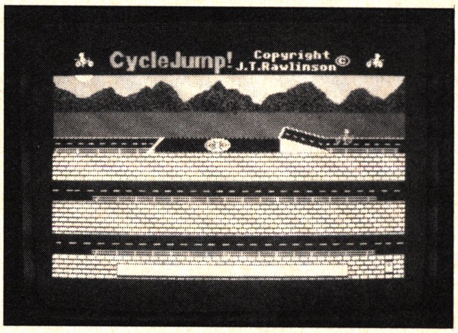
Today, sports fans, we will talk about a new motorcycle jumping game called *CycleJump*. In this game, the player jumps a motorcycle off a ramp over barrels. And if he is good enough, the player gets the opportunity to jump the famous El Gato River Canyon in a special jet cycle. Best of all — no bones are broken should you miss a jump. You can get right back on your saddle and try again (Evel Knievel should love this).

CycleJump comes on an unprotected disk with a sheet that explains the object of the game. It is written for the CoCo 3 with a disk drive and a joystick.

There are three levels to the game. The object of the first level is to jump off a ramp and land on a target center, which varies randomly for each jump. The speed of the cycle is controlled by the position of the right joystick, from full left for stop to full right for top speed. The distance traveled through the air is determined by the speed of the cycle as it leaves the ramp.

The cycle makes two passes across the bottom of the screen before it comes to the ramp, which gives the player time to gauge his speed. The rider receives 250 points for landing on the target, or 0 points if he misses. After 3000 points are amassed or 12 jumps made, the rider goes to Level 2.

The second level is like the first, except that on this level, instead of trying to land on a target, the rider must jump over barrels. To add to the difficulty in scoring points the cycle must land within the width of one barrel from the last barrel, otherwise points are lost. After 5800 points are reached, it is time to go to Level 3.



In Level 3 the screen changes to a river canyon and the rider trades in his cycle for the SuperRocketCycle to jump the El Gato River Canyon. Here the joystick is used to set the thrust. Should a jump be attempted with the thrust set incorrectly, the rocket cycle disintegrates in midair, and the rider loses 1000 points.

Every successful jump scores between 5000 and 10,000 points; scoring 50,000 points puts the rider in the Hall of Fame and wins the game. But keep in mind there is a time limit. (Bonus time is awarded for good jumps, though.) If the rider's score goes under 100 points, the game ends.

CycleJump is written with Hi-Res graphics so the game looks pretty impressive on my RGB monitor, and it is an enjoyable game to play. With a deluxe joystick *CycleJump* is fairly easy to play (I joined the Hall of Fame in three tries), but a little more difficult with a joystick that doesn't self-center.

CycleJump is the first commercial work of Thomas Rawlinson, and I was impressed. (Soap box time.) I feel any computer is only as good as the people who write programs for it, and with new writers like Mr. Rawlinson coming up, we know the CoCo is alive and well.

CycleJump is a good-looking game that isn't too difficult for anyone, and the younger arcade gamers will especially like it. The price makes it a good deal. So, hop aboard your bike and we'll see you in the air.

(J.T. Rawlinson Software, #361 St. Germain Ave., Toronto, ON M5M 1W6, Canada, 416-782-5718; $14.95 plus $2 for S/H)

—Steve Griffith

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

Action Arcade Pack: Volume 2, a set of two arcade games for the CoCo 3. *Pengy in Polarland*, similar to the arcade game *Pengo*, is written in BASIC; the goal is to avoid the evil Munchers and return safely to Peng City. *Pyramid Pete*, written in machine language, is similar to the arcade game *Q-bert. Christopher English Communications, 40-25 College Point Blvd., #8G, Flushing, NY 11354, (718) 445-6589; $9.95.*

Big RAMDisk, a set of eight RAM disk programs for eight combinations of Disk BASIC/drive setups and also two utilities: *Copydisk*, a program that copies files between physical disks and RAM disks; and *Relocate*, a program that changes *Big RAMDisk*'s memory location should another machine language program cause a conflict. Requires a 512K CoCo 3 and "any version of Disk BASIC." *Danosoft, P.O. Box 124, Station A, Mississauga, ON L5A 2Z7, Canada, (416) 897-0121; $12.95 U.S., $14.95 Cdn., $2.50 for S/H.*

CGP*Max, a utility for printing color pictures on Radio Shack's CGP-220 inkjet color printer. Features support of "the full range of colors the CoCo 3 can produce on an RGB monitor." It prints **HSCREEN2** pictures and works with *VuMaster* and the *CoCo Max III*'s **TRANSLAT** utility. For the CoCo 3 and a disk drive. *Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203, (517) 787-3610; $14.95 plus $2.50 S/H.*

Comics+, a graphics editor designed to help users create comic strips. Features a point-and-click icon-oriented interface with pull-down menus. Options include Draw, Paint, Lines, Magnify, Undo, etc. It also includes a clip art library of 42 predrawn faces, eyes, noses, mouths and hands. Requires a disk drive, a self-centering joystick, a DMP 105 or 106 printer, and a CoCo 1, 2 or 3 having at least 64K. *E.Z. Friendly, 118 Corlies Ave., Poughkeepsie, NY 12601, (914) 485-8150; $21.95 plus $1.50 S/H.*

KJV on Disk #4, Exodus chapters 22 through 40 of the King James version of the Bible on disk in ASCII files for CoCos 1, 2 and 3. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; $3.*

◆**Lottery Made Easy**, a menu-driven Lotto game that helps players choose their numbers. Supports Pick 7, Pick 8, Pick 12 and Pick 20. Requires a CoCo 3, one disk drive and an RGB monitor. *RRA & Company, P.O. Box 17087, Des Moines, IA 50317, (515) 262-3858; $15.*

Pt — File Manager, a machine-language utility designed to simplify file and directory management. Programs can be executed in a point-and-shoot environment. "*Pt* will work with any program that takes its parameters from the standard OS-9 shell command line." Designed to work as a stand-alone or in tandem with r^3's *M — Menuing System. r^3 Systems, 4072 E. 22nd St., Suite 178, Tucson, AZ 85711, (602) 745-2327; $19.95 plus $3 S/H.*

Star*Max 2.0, a set of utilities used to print color pictures on the Star NX1000 Rainbow color printer. Supports the range of colors the CoCo 3 can produce on an RGB monitor; TV/composite monitors can also be used. Features printing of **HSCREEN2** pictures and *CoCo Max III* double-screen pictures. *Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203, (517) 787-3610; $19.95 plus $2.50 S/H.*

UltraEd+, a program to move the ROM pack *EDTASM+* code to disk, add disk I/O and utilize the hardware of the CoCo 3. Features 80-column screen, dual buffers, key repeat and double speed. *Supersoft, Inc., 363 Oakwood Ave., Jackson, MI 49203, (517) 787-3610; $22.50 plus $2.50 S/H.*

Vocab, a one- to six-player word game (the computer can play all six hands) modeled after the Parker Brothers game of Scrabble. Players try to outscore each other by creating words and placing them on the board. Requires a disk drive and a CoCo 3 with at least 128K. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $19.*

◆ **First product received from this company**

The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

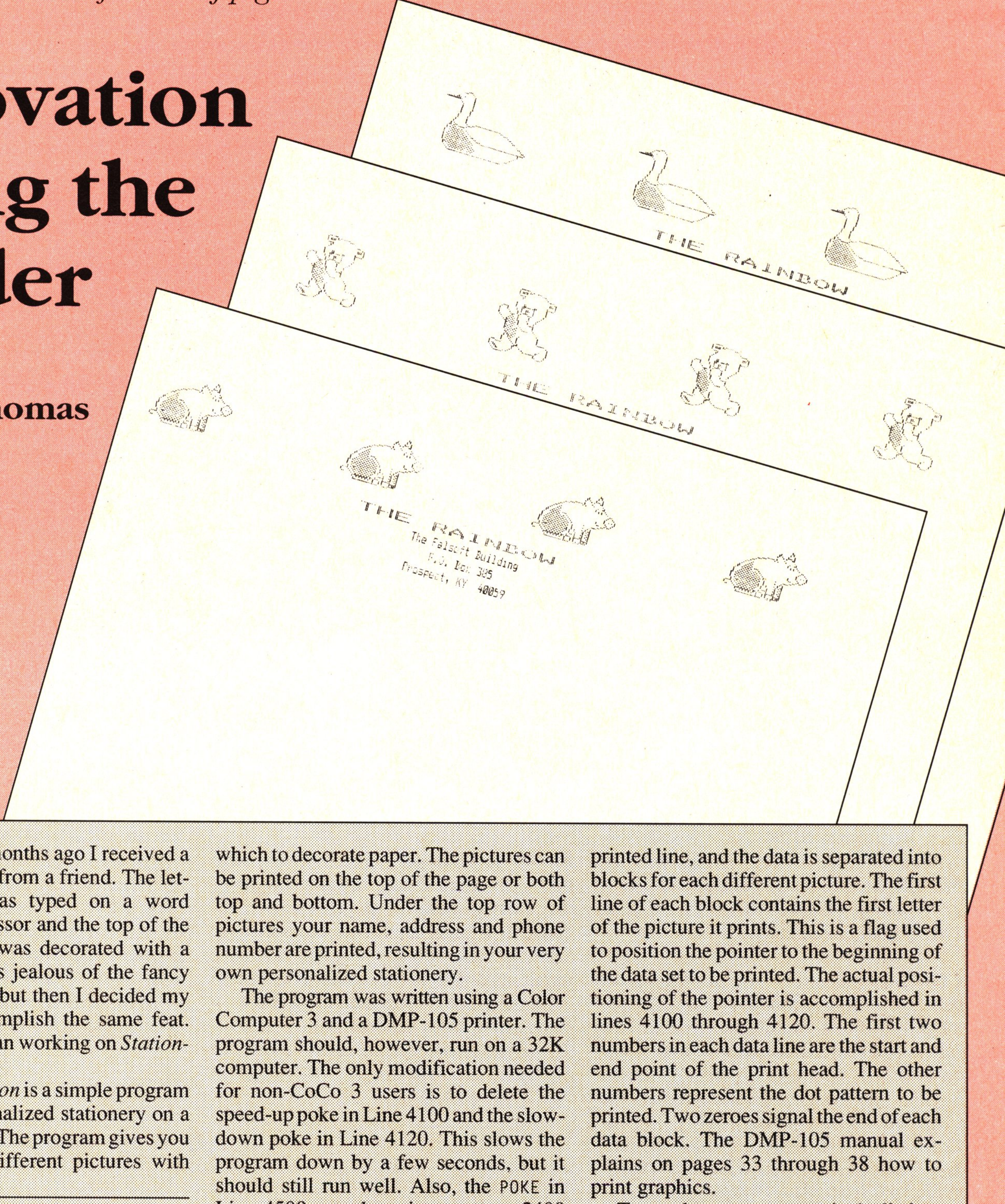
By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

—Lauren Willoughby

. . and to think I was jealous of pigs

Innovation Along the Border

by Scott Thomas



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A few months ago I received a letter from a friend. The letter was typed on a word processor and the top of the page was decorated with a row of pigs. I was jealous of the fancy letterhead at first, but then I decided my CoCo could accomplish the same feat. That's when I began working on *Stationery Station*.

Stationery Station is a simple program that creates personalized stationery on a DMP-105 printer. The program gives you a choice of six different pictures with which to decorate paper. The pictures can be printed on the top of the page or both top and bottom. Under the top row of pictures your name, address and phone number are printed, resulting in your very own personalized stationery.

The program was written using a Color Computer 3 and a DMP-105 printer. The program should, however, run on a 32K computer. The only modification needed for non-CoCo 3 users is to delete the speed-up poke in Line 4100 and the slowdown poke in Line 4120. This slows the program down by a few seconds, but it should still run well. Also, the `POKE` in Line 4500 sets the printer rate to 2400 baud. If you want to operate at 600 baud, delete the `POKE`. For other printers you must refer to the manual for any needed printer conversions.

The graphics for the program are located in the data statements at the end of the program. Each data line represents a printed line, and the data is separated into blocks for each different picture. The first line of each block contains the first letter of the picture it prints. This is a flag used to position the pointer to the beginning of the data set to be printed. The actual positioning of the pointer is accomplished in lines 4100 through 4120. The first two numbers in each data line are the start and end point of the print head. The other numbers represent the dot pattern to be printed. Two zeroes signal the end of each data block. The DMP-105 manual explains on pages 33 through 38 how to print graphics.

To use the program, type in the listing, save the program, and enter `RUN`. A simple menu appears and asks you to press the first letter of the graphics character you want to use. A tone sounds when you press a key. If you press an invalid key, another tone sounds and the program waits for you to enter a correct response. After

---

Scott Thomas has owned a color computer for about five years and has enjoyed THE RAINBOW *for four years. He's a junior at Western Michigan University majoring in computer information systems. He can be contacted at 1205 Red Pole Drive, DeWitt, MI 48820.*

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a few seconds you are asked if you need to enter your name. When the program is started, the information is blank; if you want your name information printed, press Y. You are then asked for your name, address, etc. Just press ENTER to leave out any information. As long as the program is running, the information you type is preserved. If you need to change it, type Y when asked if you need to enter your name. Next you are asked if you want graphics printed on the bottom of the page as well; answer Y (yes) or N (no). After the printing is completed, you are asked if you want another copy of the same thing. If you answer N, you will return to the menu for a new selection.

Stationery Station is intended for those who want a unique letterhead and want to exercise their CoCos' capabilities. ❑

32K ECB

110	79
222	210
3990	85
4210	250
4380	82
5010	144
5040	242
5110	144
5150	154
5210	175
5270	51
5320	122
5370	131
5430	46
5490	204
END	224

The listing: STATION

```
0 ' STATIONARY STATION
1 ' COPYRIGHT 1989 FALSOFT, INC
2 ' BY:  SCOTT THOMAS
3 ' *****************
4 '
5 ' TITLE AND MENU
9 DIM X(150)
10 CLS0
20 PRINT@7,"stationary";CHR$(128
);"station";
30 PRINT@47,"by";
40 PRINT@74,"scott";CHR$(128);"t
homas";
50 PRINT@139,CHR$(145);STRING$(8
,147);CHR$(146);
60 PRINT@171,CHR$(149);" BEAR
";CHR$(154);
70 PRINT@203,CHR$(149);" COW
";CHR$(154);
80 PRINT@235,CHR$(149);" DUCK
";CHR$(154);
90 PRINT@267,CHR$(149);" FACE
";CHR$(154);
100 PRINT@299,CHR$(149);" PIG
 ";CHR$(154);
110 PRINT@331,CHR$(149);" RABBIT
 ";CHR$(154);
120 PRINT@363,CHR$(149);" QUIT
 ";CHR$(154);
130 PRINT@395,CHR$(148);STRING$(
8,156);CHR$(152);
140 PRINT@455,"enter"CHR$(128)"f
irst"CHR$(128)"letter";
150 PRINT@491,"to"CHR$(128)"sele
ct";
160 P$=INKEY$:IF P$=""THEN160
165 SOUND 128,1
170 IF P$="Q" THEN GOSUB4500:END
180 IF INSTR(1,"BCDFPR",P$)=0 TH
EN 190 ELSE 200
190 SOUND10,10:GOTO160
200 GOSUB4100
210 CLS:PRINT"DO YOU NEED TO ENT
ER NAME(Y/N)?"
220 Q$=INKEY$:IF Q$="N"THEN222 E
LSE IF Q$="Y" THEN GOSUB 4400 EL
SE 220
222 PRINT"PRINT GRAPHICS ON BOTT
OM(Y/N)?"
224 BT$=INKEY$:IFBT$="Y"THENBT=2
 ELSEIFBT$="N"THENBT=1 ELSE 224
230 PRINT"READY PRINTER, PRESS R
ETURN*":EXEC44539:GOSUB4500:PRIN
T#-2,CHR$(18);CHR$(27);CHR$(BO);
240 FOR N1=1 TO BT
250 READ S,E:IF S=0 THEN 260 ELS
E GOSUB4000:GOTO250
260 IF N1=1 THEN GOSUB 4300
270 NEXT N1
280 PRINT:PRINT"PRINT ANOTHER PA
GE?":Q$=""
290 Q$=INKEY$:IF Q$="Y" THEN 300
 ELSE IF Q$="N" THEN 10 ELSE290
300 GOSUB4100:GOTO230
310 END
320 '
330 ' ** END OF MAIN PROGRAM **
340 '
3990 ' **** SUBROUTINES ****
3998 '
3999 ' PRINT GRAPHICS
4000 FOR N2=0 TO N1
4010 IF N1=2 AND N2=0 THEN S=S+2
5:E=E+25
4020 GOSUB 4200
4030 FOR Z=S TO E:IF N2=0 THEN R
EADX(Z)
4040 PRINT#-2,CHR$(X(Z));:NEXT Z
4050 S=S+128:E=E+128:GOSUB4200:F
OR Z=S TO E:PRINT#-2,CHR$(X(Z-12
8));:NEXTZ
4060 S=S-128:E=E-128:NEXT N2
4070 PRINT#-2:RETURN
4098 '
4099 ' FIND BEGINNING OF DATA
4100 POKE65497,0:RESTORE
4110 READ D$:IF D$<>P$ THEN 4110
4120 POKE65496,0:RETURN
4198 '
4199 ' MOVE PRINT HEAD
4200 PRINT#-2,CHR$(27);CHR$(16);
CHR$(N2);CHR$(S);
4210 RETURN
4298 '
4299 ' PRINT NAME AND ADDRESS
4300 PRINT#-2,CHR$(30);CHR$(27);
CHR$(14)
4310 PRINT#-2,STRING$((40-LEN(N$
))/2," ");N$
4320 PRINT#-2,CHR$(27);CHR$(15);
CHR$(27);CHR$(20);
4330 PRINT#-2,STRING$((134-LEN(A
1$))/2," ");A1$
4340 PRINT#-2,STRING$((134-LEN(A
2$))/2," ");A2$
4345 PRINT#-2,STRING$((134-LEN(P
H$))/2," ");PH$
4350 IFBT=2 THEN FORI=1TO49:PRIN
T#-2:NEXTI
4360 PRINT#-2,CHR$(18);:RESTORE
4370 GOSUB4100
4380 RETURN
4398 '
4399 ' INPUT NAME AND ADDRESS
4400 LINEINPUT"ENTER NAME:";N$
4410 LINEINPUT"STREET ADDRESS:";
A1$
4420 LINEINPUT"CITY,STATE,ZIP:";
A2$
4425 LINEINPUT"PHONE NUMBER :";P
H$
4430 RETURN
4498 '
4499 ' SET PRINTER TO NORMAL
4500 POKE150,18:PRINT#-2,CHR$(30
);CHR$(27);CHR$(19);
4510 PRINT#-2,CHR$(27);CHR$(54);
CHR$(27);CHR$(15);CHR$(27);CHR$(
32);
4520 RETURN
4996 '
4997 ' ***** DATA *****
4998 '
4999 ' DATA BLOCK FOR PIG
5000 DATA P,50,61,192,176,152,16
0,192,128,192,176,172,163,198,24
8
5010 DATA 34,69,192,160,160,144,
136,136,136,132,132,132,130,130,
130,130,130,132,131,132,128,128,
128,129,130,128,152,132,176,128,
181,134,136,144,160,128,192,192
5020 DATA 27,72,224,176,136,196,
162,209,169,212,170,213,128,160,
160,160,192,128,128,128,128,128,
128,128,128,128,128,128,128,128,
128,128,128,128,128,224,128,128,
128,128,156,162,193,136,128,201,
162,156
5030 DATA 24,69,240,158,129,208,
168,212,170,213,170,213,170,213,
170,213,170,213,170,212,169,210,
132,152,224,128,128,128,128,128,
128,168,128,192,160,144,232,136,
136,137,133,132,130,130,129,128,
129,129
5040 DATA 21,58,224,144,144,147,
156,160,202,149,172,213,170,213,
170,213,170,213,170,213,170,213,
170,149,142,192,156,163,160,166,
248,128,128,128,213,254,129,170,
213,255
5050 DATA 22,58,129,129,128,128,
128,128,129,134,154,147,150,147,
150,147,150,147,150,147,148,147,
145,158,145,145,145,142,128,143,
145,153,145,153,143,138,142,142,
135
5060 DATA 0,0
5070 '
```

```
5080 ' DATA BLOCK FOR RABBIT
5090 DATA R,32,61,192,160,160,14
4,136,196,226,242,241,137,133,13
1,129,129,129,129,129,129,131,13
3,137,241,242,226,196,136,144,16
0,160,192
5100 DATA 30,63,252,227,240,184,
188,158,159,142,134,159,160,192,
132,162,196,128,224,224,128,196,
162,132,192,160,159,134,142,159,
158,188,184,240,227,252
5110 DATA 31,62,224,144,136,132,
130,129,193,184,134,129,128,129,
241,248,253,252,252,253,248,241,
129,128,129,134,184,193,129,130,
132,136,144,224
5120 DATA 31,62,143,144,144,144,
152,142,255,144,144,160,160,192,
135,143,159,159,159,159,143,135,
192,160,160,144,144,255,142,152,
144,144,144,143
5130 DATA 35,58,254,129,128,128,
128,136,132,132,133,133,139,241,
241,139,133,133,132,132,136,128,
128,128,129,254
5140 DATA 36,57,129,129,129,129,
129,129,129,129,129,129,128,128,
129,129,129,129,129,129,129,129,
129,129
5150 DATA 0,0
5160 '
5170 ' DATA BLOCK FOR COW
5180 DATA C,27,66,196,172,156,13
3,146,146,131,142,148,138,140,14
4,144,144,144,144,144,240,240,24
0,240,240,240,240,240,240,176,14
4,176,248,248,248,248,248,248,24
0,240,240,224,224
5190 DATA 27,66,131,132,132,130,
130,134,136,176,224,156,191,255,
254,252,252,216,128,129,131,131,
231,231,247,247,247,243,240,224,
128,129,135,143,191,255,159,135,
193,254,128,255
5200 DATA 35,67,135,136,152,225,
161,163,241,128,128,152,230,146,
144,144,161,163,163,163,145,160,
194,161,161,194,172,144,224,140,
255,131,254,255,224
5210 DATA 36,67,240,216,215,240,
142,249,215,208,255,129,128,128,
128,128,128,128,128,240,216,215,
240,142,129,240,216,215,240,143,
128,131,135,135
5220 DATA 0,0
5230 '
5240 ' DATA BLOCK FOR FACE
5250 DATA F,28,65,240,152,252,13
1,252,178,153,211,213,213,213,14
5,129,129,199,167,222,160,208,12
8,190,211,149,137,137,137,137,12
9,129,129,167,199,254,128,134,24
8,152,224
5260 DATA 28,65,135,136,147,172,
147,134,137,136,136,248,134,210,
170,213,170,213,170,133,128,128,
128,128,129,134,250,145,144,156,
146,144,136,166,145,140,163,152,
134,129
5270 DATA 37,52,135,136,146,165,
170,213,229,208,160,192,128,128,
192,160,144,143
5280 DATA 22,70,224,156,131,128,
128,192,192,192,192,192,192,192,
192,192,192,192,192,192,192,192,
192,192,193,193,193,193,193,192,
192,224,160,160,160,224,192,192,
192,192,192,192,192,128,128,128,
128,128,134,152,224
5290 DATA 22,71,135,136,131,131,
131,131,129,128,128,128,128,128,
131,130,132,132,132,135,128,143,
136,136,136,143,132,132,132,135,
128,135,132,132,132,132,135,128,
128,128,128,128,129,131,131,131,
135,135,135,128,136,135
5300 DATA 0,0
5310 '
5320 ' DATA BLOCK FOR BEAR
5330 DATA B,39,63,158,161,173,17
3,237,141,129,134,132,130,130,13
0,130,130,130,132,132,132,136,14
4,160,160,160,160,192
5340 DATA 39,64,240,136,132,131,
128,224,224,128,128,128,128,128,
192,192,128,128,128,128,128,128,
240,166,166,166,160,159
5350 DATA 29,59,240,136,132,132,
132,156,160,192,128,128,131,140,
240,128,223,163,161,189,173,201,
193,193,191,129,128,128,128,128,
192,176,143
5360 DATA 29,56,131,132,136,144,
160,192,240,168,213,171,213,169,
192,159,240,128,128,128,128,136,
183,192,192,192,240,140,130,129
5370 DATA 35,57,191,213,170,213,
170,213,170,212,169,130,132,136,
144,144,144,144,128,128,135,136,
144,160,192
5380 DATA 35,65,240,141,131,134,
157,170,213,138,133,128,248,132,
128,128,128,128,128,128,128,128,
128,128,128,159,160,160,160,160,
160,160,192
5390 DATA 28,66,188,194,146,178,
228,196,132,133,130,128,128,128,
128,128,193,186,140,133,134,136,
144,160,160,192,192,192,192,192,
192,192,192,176,144,136,128,128,
128,192,191
5400 DATA 30,65,129,130,132,133,
133,132,132,132,130,130,130,129,
128,128,128,128,128,128,128,128,
128,128,128,128,128,128,128,128,
131,130,132,132,132,132,130,129
5410 DATA 0,0
5420 '5430 ' DATA BLOCK FOR DUCK
5440 DATA D,18,35,192,192,192,22
4,224,224,240,232,196,130,146,13
0,129,129,129,130,132,248
5450 DATA 17,35,129,129,129,129,
129,129,129,129,129,130,132,248,
128,128,128,128,128,128,255
5460 DATA 27,35,224,159,128,128,
128,128,224,158,129
5470 DATA 24,62,224,152,166,193,
192,128,128,128,128,143,208,160,
160,160,144,144,136,136,136,136,
136,136,136,136,136,136,136,136,
136,136,136,136,136,144,144,160,
160,160,192
5480 DATA 21,72,240,142,129,213,
170,213,170,212,169,213,169,213,
169,210,164,200,144,160,192,192,
128,128,128,128,128,128,128,128,
128,128,128,128,128,128,128,128,
128,128,128,128,128,128,129,129,
130,132,132,136,144,160,160,192
5490 DATA 21,75,191,192,213,170,
213,170,213,170,213,170,213,170,
213,170,213,170,213,170,212,168,
209,129,130,130,130,132,132,132,
132,132,132,132,132,132,132,132,
132,132,132,132,132,132,132,132,
132,132,132,132,196,164,156,132,
133,133,130
5500 DATA 22,68,131,132,137,146,
165,170,165,170,165,170,165,170,
165,170,165,170,165,170,165,170,
165,162,160,160,160,160,160,160,
160,160,160,160,160,160,160,160,
160,160,160,160,160,144,136,136,
132,130,129
5510 DATA 0,0
```

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See Us On DELPHI

A utility that lets you print labels one at a time

One Label or Two?

by Kevin Deneen

Why write another label maker program? There are lots of label programs available for the CoCo, and most are packed with features and reasonably priced. But this little gem has something the others don't — simplicity.

Except at Christmas, I don't need to print a large number of labels at one time. However, I do quite frequently correspond with other computer hobbyists, authors and advertisers. What I need is a simple utility to print a label or two, then remain available like any OS-9 command.

The program *Label* is short and sweet. Its only function is to print a three-line label. Once it's compiled, you can place it in your `CMDS` directory. If you have Level II, you can merge it with `Shell`. Then when you boot your system, *Label* is in memory, working lightning fast every time you need it. If you have *Multi-Vue*, you can use the mouse to select *Label* from any directory, then select Open from the Files menu to run it. In any case *Label* works on any CoCo with OS-9 Level I or Level II.

To use *Label*, simply type the program name at the OS-9 prompt (e.g., `OS9:label`), then press ENTER. You should have your printer online and paper or gummed labels ready. The program loads into memory and executes like any other OS-9 command. After loading, the program responds by prompting you to enter the name and address for the label. As soon as you've entered the ZIP code, your printer goes into action, typing out your label. The program then prompts you to press ENTER if you want another label or ESC if you want to quit

---

Kevin Deneen holds an associate's degree in tool engineering and works for a large aerospace company as a numerical control machine tool programmer. Besides the CoCo, his other hobbies include flyfishing and mountain trail hiking. He may be contacted at 65766 E. Sandy River Lane, Rhododendron, OR 97049.

The Listing: `label.c`

```
/* PROGRAM NAME:  label.c          */
/* By: Kevin  Deneen               */
/* Copyright 1989, Falsoft Inc.    */
/* Keyboard enter and print single labels */

/* Defining a variable outside of a function allows it to be global */

#include <stdio.h>  /*  Header file for input/output functions  */
#define LEN 41      /*  Maximum length of string for name & address  */
#define LC  21      /*  String length for city  */
#define LS   3      /*    "       "      "  state */
#define LZ  10      /*    "       "      "  zip   */
#define STOP EOF    /*  EOF = <CTRL> + <BREAK>  */

struct ldata {                      /*  ldata is a template for */
             char *name[LEN],       /*  future definitions      */
                  *address[LEN],
                  *city[LC],
                  *state[LS],
                  *zip[LZ];
             };


/*      'main()' calls all the other functions  */

main()
{
  struct ldata label, *point2label;   /*  Define structures  */
  int ch;                       /*  Variable for reading keypress  */
  point2label = &label;         /*  Get address of label structure */

  while (ch != STOP)            /*  While <CTRL> + <BREAK> is not pressed  */
    {
    enterit(point2label);   /* Send the address of 'label' to enterit */
    printit(point2label);   /* Send the address of 'label' to printit */
    printf("\nHit <ENTER> if you want another label.");
    printf("\nHit <ESC> if you want to quit.\n");
    ch = getchar();
    }
}
```

the program. It should be noted that ESC on a CoCo 3 is accomplished by pressing the BREAK key while holding down the CTRL key. If you have a CoCo 1 or 2, use the CLEAR key in place of CTRL.

When typing in your label data, be aware that as is, the name and address string length is set to 40 characters. The city string is set to 20, the state is set to 2, and the ZIP code to 9 characters. If you want, you can change these values by adjusting the define statements at the beginning of the program before compiling. Be sure to add 1 to the desired value for a null character. If you type in a string longer than the amount of space reserved, the system will not have room for the null character. Should this happen, the next string stored in memory will most likely be concatenated to the string that is too long, creating an odd-looking label.

Although I have made no attempt to explain the program line by line, *Label* is commented for those who are unfamiliar with the C programming language. Feel free to add to or modify the program. ❑

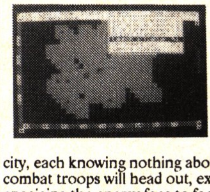
```
/*  End of main  */

/*  function to enter label data from the keyboard  */

enterit(data)
struct ldata *data;   /*  Define a pointer to the structure  */
{
  printf("Enter requested data after each prompt.\n\n");
  printf("NAME: ");
  gets(data->name);       /*  Get keyboard entry and store at */
  printf("\nADDRESS: "); /*  address 'pointed to'  */
  gets(data->address);
  printf("\nCITY: ");
  gets(data->city);
  printf("\nSTATE: ");
  gets(data->state);
  printf("\nZIP CODE: ");
  gets(data->zip);
}
/*  End of enterit()  */

/*  Function to print label   */

printit(print)
struct ldata *print;    /*  Define a pointer to label structure  */
{
  FILE *ptr;                     /* OS9 treats the printer as a file */
  ptr = fopen("/p", "w");        /* "/p" = name of path to printer   */
  fprintf(ptr,"%s\n",print->name);   /* Print the label data that   */
  fprintf(ptr,"%s\n",print->address);  /* is pointed to  */
  fprintf(ptr,"%s, %s %s", print->city, print->state, print->zip);
  fprintf(ptr,"\n\n\n\n");       /*  4 carraige returns  */
  fclose(ptr);                   /*  Close path to printer  */
}
/*  End of printit()  */
```

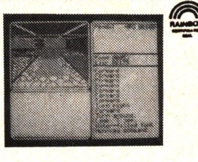


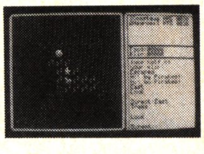
Overlord New!

Peace through superior firepower is the catch phrase in this sophisticated wargame simulator. Victory shall not fall to he who is the mightiest, oh no, but to he who can plan ahead and develop the better strategy. You must ensure that all your troops are brought into battle at the right moment, and for that you must set your most industrialized cities to producing troop transporters. Other cities will build Aircraft carriers, fighter jets, paratroop regiments, submarines, spy planes, battleships, destroyers, and cruisers. Up to three people can play the game simultaneously, each starting out at his own base city, each knowing nothing about the strenghts and locations of his enemies' forces. The player's own combat troops will head out, exploring the world as they go, capturing towns that lie waiting, or engaiging the enemy face to face. You can set any or all of the three players to be operated by the sinister silicon brain of your CoCo 3, and battle against them or let them battle each other.

Price: $29 US / $34 Cdn.

Overlord requires: 128k CoCo 3, 1 drive and a mouse or joystick.

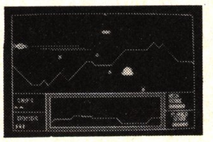




the Seventh Link

We've said it before and we'll say it again: This is the best fantasy role-playing adventure the CoCo has ever seen, bar none. A full 3 discs are filled with worlds, towns castles, and dungeons. The dungeons are spectacular 3D creations, filled with full colour, hi-res monsters, ladders, doors and pits, chests, pools, lava and flooded rooms. You would not believe that a CoCo 3 could produce such high-speed detailed graphics. The dungeons are only part of the story, however. In the wild lands above, you'll find monsters, towns and castles. The towns will reveal merchants, learned locals, even a friend or two who will join your quest. Maybe you will find band of pirates as you tread the windswept shores. Could you and your companions defeat them? Test your mettle during the hundreds of hours of play time The Seventh Link will bring you.

$38 US/ $48 Cdn. Req: CoCo3, 40 track drive (RS drive is OK if it's white)



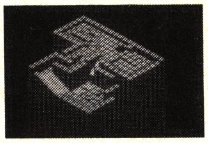
Defendroid

A classic returns! Arcade realism for the Coco 3 is brought one step closer with this outstanding action game. Sinister aliens are appearing in the skies over Zabburtuth, and you and your Turbo-Flier are all that stand in their way! Use lasers and smart-bombs, fuel depots and your astronaut-tractor to save the hapless inhabitants from certain stir-frying as hideous alien cuisine!

This program contains a graphics manipulation routine so advanced, we registered a copyright for it alone. See what a threefold increase in software speed and memory efficiency can do for your CoCo 3!

Price $29 US / $34 Cdn New!

Defendroid requires: 128k CoCo 3, 1 drive, 1 joystick.



New! Those Darn Marbles

Dedicate a program to 512k machines only, and all sorts of new things are possible. Those darn Marbles is the first CoCo game to use the built-in hardware screen scrolling features of the CoCo 3. This means that all the computer's time cn be dedicated to controlling the game itself (sound effects, moving objects around, etcetera) rather than the time-intensive chore of scrolling an entire 32k screen around. You will be amazed to see how smoothly a HARDWARE-scrolled screen can move. Compare Those Darn Marbles with any other 3D marble type game on any computer, and you will be convinced that your CoCo 3 really can stand with the best of them. (One of our playtesters remarked, upon seeing the pre-release version of TDM: "My Amiga isn't that smooth!")

Not convinced? TDM is so chock-full of graphics that it comes on (count 'em) six discs!

It's been said many times, but this time it's true: Your CoCo 3 game library is not complete without a copy of Those Darn Marbles.

Price $32 US / $38 Cdn. Requires: 512k CoCo 3,1 drive,joystick.

Caladuril II: Weatherstone's End

"Some of the best graphics to be seen on a CoCo 3" will lead you through a land of mystery, as you attempt to discover the fate of the Weatherstone. Smooth scrolling 16 colour graphics and a sophisticated command interpreter lend realism and enjoyment to one of the most extensive adventures to be found on a CoCo. Package includes 2 discs, an 11x17" map, a velvet pouch of powerstones and a 20 page booklet.

Price: $32 US/ $38 Cdn

Requires: 128k CoCo 3, 1 drive

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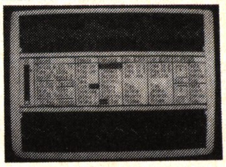
Finally, help is here! Calduril 1 and 2 books are 15 pages and $3.50 each. The Seventh Link books are 40 pages (lots of maps) and $5.50.



Studio Works

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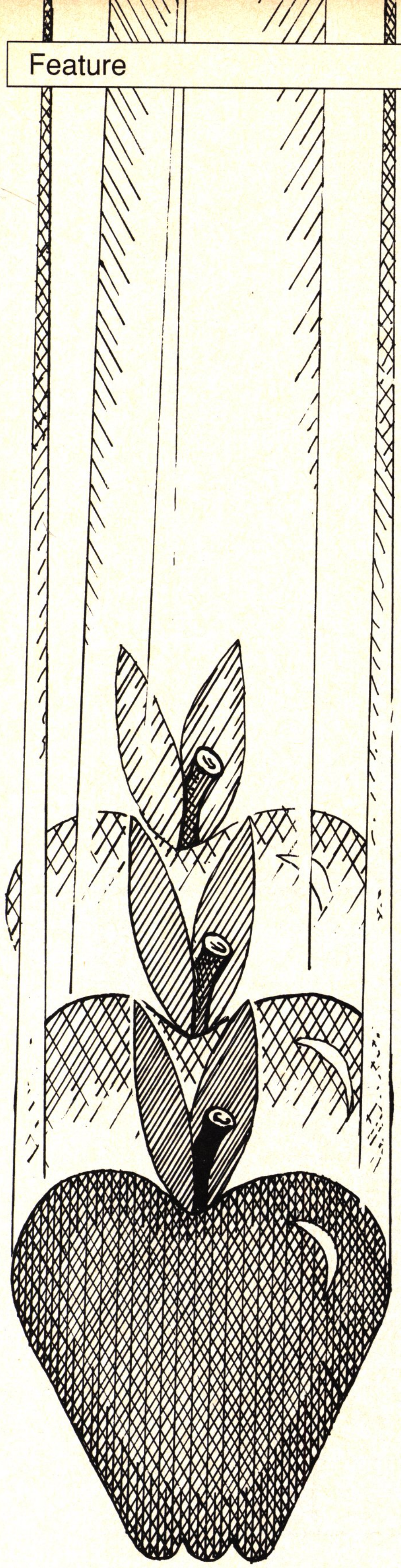

One of the few ways to really enjoy Newtonian physics

What Goes Up . . .

by Hector F. Cuadra

G*ravity* is an Extended Color BASIC educational game that provides practice and simulation in one of the most fundamental concepts of Newtonian physics — gravity. It simulates the parabolic motion of any object under the influence of an initial arbitrary force and the force of gravity. The game's objective is to try to hit the target by predicting the path that a projectile will take. You do this by specifying the initial velocity and elevation angle. From then on, there is no influence on the object except the acceleration due to gravity (a constant). The trick for solving the problem is to separate the motion of the projectile into vertical and horizontal components.

After you type `RUN`, the program draws a `PMODE 4` picture while displaying the title. After this two instruction screens appear. After the last instruction screen the data input screen gives the position of the target and allows you to view the picture. Typing H at the Want a View prompt sends you to the Help/Solution screen. When viewing the picture, press any key to bring back the Data Input screen and proceed with the velocity and angle data. Using the horizontal distance and height where the target is located, you calculate or try different combinations of velocities and angles for the launch of the projectile. In this mode you have the option of making the entire path of the projectile visible or just plotting it momentarily. This is helpful when your paths tend to lie on top of one another, making it hard to see the recent path. If you commit an error entering the data, don't worry because you have an opportunity to change it. Once you have entered the correct data, the `PMODE 4` picture is displayed. The stone or bullet (you name it) is at the mercy of the gravity force and the initial velocity. A ground-to-ground path is plotted according to your data. Whatever the consequences of the initial data entered, a Results screen is displayed at the end of the trajectory.

You are allowed three shots per target. Hitting the right target gives you 100 points. If by chance you hit the wrong target, the big building, you are penalized by losing 100 points. If you score by hitting the tiny box, a new position for the target is given to you, plus an extra shot. If you miss three consecutive shots, you are sent to the menu screen.

In the menu section you have the option of finding the solution to the motion problem for the last target you missed. Also, you can review the results or instructions or view the plot of past attempts. Since you

---

Hector is a graduate student in education whose main interest is using computers as alternatives to traditional methods of learning. He has degrees in science and art and finds the computer perfect for combining the two subjects. He may be contacted at 1336 E. Mifflin, #3, Madison, WI 53703, (608) 255-0814.

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missed three consecutive shots, the menu offers you the option of selecting a new target. With this option you can choose an easy or a hard target. To try again, press 2 and the sequence starts over. Option 3 is for rebuilding the picture and erasing the accumulation of trajectories. If you have a problem with cluttering paths in the screen, choose Option 3. Options 1, 3, 4, 5 and 6 always return you to the menu.

Program Structure

The three important concepts employed in this program are the `PCOPY` and `PPOINT` commands and the use of screen areas simulating real areas. The `PCOPY` command allows you to duplicate the initial graphics, drawn on pages 1 through 4, to pages 5 through 8. With this I am able to erase the paths and repair the picture by just copying back the original picture located at pages 5 through 8 in memory to the pages used by `PMODE 4,1`. The `PPOINT` command tests whether the location of the projectile is white. If the pixel is white, it is tested to see what type of obstacle it is. Further testing is done by finding the numerical value of the area where the point or target is located.

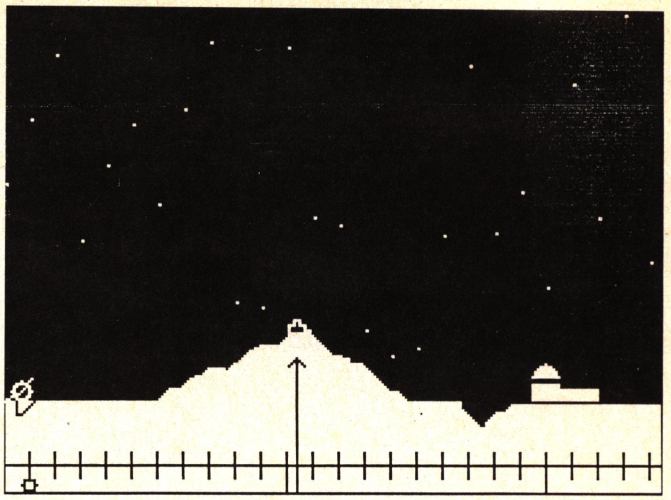
The program variables are divided into two categories. The game status category includes those that decide the sequence of the program execution according to points or number of attempts.

Game Status Variables:

`J=1`	by-passes instructions initially
`ZZ=1`	time for new target & 100 points
`TR=1`	new target, but loses 100 points
`N$`	menu's subroutines
`TL`	number of tries
`TT`	score

The mathematical variables are those used in the simulation to calculate the position for the projectile and target. These are as follows:

`PI`	circle's constant
`G`	acceleration of gravity, constant
`T`	time interval
`A$,A1,A,B`	angles
`TM`	time at peak of path, 1/2 time
`V$,V`	initial velocity
`X,Y`	physical position or projectile
`X1,Y1`	screen mapping corrections of X,Y
`XT,YT`	position of target



`EXEC 44539` on Line 1540 waits for a keyboard input (it functions just the same as `A$=INKEY$`. `POKE 13,0` in Line 90 is used to reset the last `INKEY$` value to null (the same as `INKEY$=""`). Line 450 contains the high-speed poke `POKE 65495,0`. This poke is used to double the speed of all functions during the plotting of the trajectory. If you have a CoCo 3, change this to `POKE 65497,0`. Also, during the initial drawing of the picture and successive target positioning, the high- and normal-speed pokes are used to speed up those sections in the program that tend to be slow in processing. Meanwhile, during data input and observation, the normal-speed poke at lines 820 and 1408, `POKE 65494,0`, is used to avoid an impatient or too-sensitive keyboard, as well as to to cool the computer chips. To slow the CoCo 3 down to normal speed, use `POKE65496,0`. ❑

32K ECB

70	222
150	212
230	145
285	51
345	10
380	216
520	68
600	204
710	111
840	151
910	198
970	45
1040	29
1150	79
1240	192
1300	175
1370	88
1500	50
1571	233
1735	54
2010	61
3135	19
6110	32
END	249

The listing: `GRAVITY`

```
0 'COPYRIGHT 1989, FALSOFT INC.
10 CLEAR300:PCLEAR8:SOUND155,1
20 PMODE4,1:PCLS(0):PMODE4,5:PCL
S(0):CLS(4):COLOR5,0
30 '***************************
32 '        constants
34 S1$="####.#":S2$="######.#":S
3$="###":PI=3.1416:G=9.8
36 '***************************
38 '            <TITLE>
39 PRINT@108,"GRAVITY";
40 PRINT@168,"parabolic";:PRINT@
178,"motion";
50 PRINT@238,"BY";:PRINT@264," H
ECTOR CUADRA";:PRINT@296,"1336 E
.MIFFLIN";:PRINT@330,"MADISON WI
";:PRINT@365,"53703";
70 IFN$="7"THENENDELSEJ=0:GOSUB1
200
90 FORN=1TO10:PLAY"L255;O5;CEGC"
:NEXT:J=1:POKE135,0:GOSUB6000
100 '***************************
110 '          instructions
120 CLS:PRINT"    kinematics of
a particle":PRINT STRING$(32,246
);
130 PRINT" PATH OF A NON-SELFPRO
PELLED    OBJECT NEAR THE EARTH'
S SURFACE":PRINT"WITH NO AIR OR
WIND RESISTANCE.";
140 PRINT" YOU CHOOSE THE INITIA
L VELOCITY":PRINT"AND THE ELEVAT
ION ANGLE 'A'":PRINT"ABOVE THE H
ORIZON."
150 PRINT"THE HORIZONTAL COMPONE
NT OF THE":PRINT"INITIAL VELOCIT
Y IS V*COS(A),":PRINT"THE VERTIC
AL ONE IS V*SIN(A)."
160 PRINT"HORIZONTAL DISTANCE TR
AVELED IS":PRINT"V*(COS(A)*T WHI
LE ITS":PRINT"HEIGHT IS V*SIN(A)
*T-.5*G*T*T."
170 PRINT STRING$(32,246);
180 GOSUB 1530
200 CLS:PRINTSTRING$(32,246);
210 PRINT:PRINT"YOUR CANNON IS A
T THE LEFT SIDE OF THE SCREEN."
220 PRINT"YOUR TARGET IS THE LIT
TLE BOX","ABOVE THE ARROW."
230 PRINT"PLEASE, DO NOT HIT THE
 LARGE","BUILDING AT YOUR RIGHT.
"
240 PRINT"THE HORIZONTAL SCALE A
```

```
T THE ","BOTTOM OF THE SCREEN IS
","CALIBRATED IN 10 METERS/LINE.
"
242 PRINT"FOR HELP ENTER 'H' AT
'VIEW'.   ...GOOD LUCK!"
250 GOSUB 1530
255 '*************************
258 '      game status
260 IF N$="4"THEN 950
285 IF ZZ=1 THEN1330:'new target
295 ZZ=0:'reset record of target
300 SOUND 200,1:SOUND 255,1:IFTR
=1GOSUB1330
305 '*************************
308 '        data input
310 CLS4:PRINT@0,STRING$(32,182)
;
320 PRINT@42,"input data";:PRINT
@64, STRING$(32,166);
330 PRINT"    [MKS-SYSTEM, METER
S/SEC.]"
340 PRINT"YOUR TARGET IS";XT-7;"
METERS AWAY ":PRINT"AT A HEIGHT
OF ";:PRINTUSINGS3$;155-YT;:PRIN
T" METERS.":PRINTSTRING$(32,45);
342 INPUT"WANT A VIEW (Y/N/H)";B
$
345 IFB$="Y"THEN GOTO 1424
346 IFB$="H"THEN1700
347 B$="N"
348 SOUND200,1
350 PRINT@256,"INITIAL LAUNCH ve
locity? =";:LINE INPUTV$:SOUND20
0,1:IFV$=""THEN350
355 V=ASC(V$):IFV<48ORV>57THEN35
0
360 PRINT@288,"ELEVATION angle(0
-90 DEG)=";:LINE INPUT A$:SOUND2
00,1:IFA$=""THEN360
365 A=ASC(A$):IF(A<48ORA>57)ORVA
L(A$)>90THEN360
370 V=VAL(V$):A=VAL(A$)
380 PRINT@320,"LEAVE PATH?";:INP
UT"(Y/N)";Q$:SOUND200,1:IFQ$=""T
HENQ$="Y":PRINT@337,"y"
390 IFQ$=""THEN400ELSEIFQ$<>"Y"A
NDQ$<>"N"THEN380
400 PRINT@352,"IS DATA OK?";:INP
UT"(Y/N)";A$:SOUND200,1:IFA$=""T
HENA$="Y":PRINT@369,"y":FORP=1TO
500:NEXT
410 IF A$="N"THEN310
415 TL=TL+1:'number of chances
420 IF A$="Y" THEN 450 ELSE 400
430 '*************************
440 '        display
450 PMODE4,1:SCREEN1,1:POKE65495
,0:COLOR5,0
470 '*************************
475 'degrees to radians
510 T=0:B=(PI/180)*A:A1=B
520 TM=(V*SIN(A1))/G:'half time
530 '*************************
540 '         plotting
545 '         formulas
548 GOSUB 3000
549 'time intervals
550 PLAY"L255;O5;C":IF V>100 THE
N T=T+.01 ELSE T=T+.1
555 'motion formulas
560 Y=T*V*SIN(B)-(G*T*T)/2
570 X=(V*COS(B))*T
575 'screen mapping formulas
590 Y=Y1-(Y*.792)
600 X=X1+X
610 IF Y=<0 AND X=<255 THEN 550
620 IF X>=255 OR Y>=180 THEN 810
:'overshoot!
630 IF (X>=XT AND X<XT+7) AND (Y
T-6<Y AND Y<=YT) THEN GOTO 1110
640 IF PPOINT(X,Y)=5 GOSUB 690:'
checking for obstacles
650 PSET(X,Y,5):'plot
660 IF Q$="N" THEN GOSUB 1570
670 GOTO 550
680 '*************************
690 '         obstacles
700 IF (X>204 AND X=<233) AND Y>
=145 THEN 740
710 IF PPOINT(X+1,Y)=5 AND PPOIN
T(X-1,Y)=5 THEN 1575
720 RETURN
730 '*************************
740 '       wrong target
750 FORPM=1TO4:SCREEN1,1:PMODEPM
,1:SOUNDPM*50,1:NEXTPM:CO=5:SCRE
EN1,1
755 IF ZZ=1 THEN 1135
760 FORR=1TO40:CIRCLE(219,150),R
,CO:GOSUB780:NEXT R:GOTO790
780 CIRCLE(219,150),R,0:RETURN
790 POKE65494,0:CLS(4):PRINT@234
,"*wrong*target*";:PLAY"L4;O1;CC
E;L1;C":TR=1:TT=TT-100
800 '*************************
```

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```
810 '           results
820 SOUND200,1:POKE65494,0
830 CLS:PRINT"           *result
s*":PRINT STRING$(32,150);
840 PRINT"INITIAL VELOCITY=";V;"
M/S":PRINT"ELEVATION  ANGLE=  ";
A;"DEGREES"
850 PRINT"HORIZONTAL RANGE=";:PR
INT USING S1$;X-7;:PRINT" METERS
"
860 PRINT"ALTITUDE @ RANGE=";:PR
INT USING S1$;155-Y;:PRINT" METE
RS"
880 PRINT"MAXIMUN HEIGHT    =";:
PRINT USINGS2$;V*SIN(A1)*TM-(G*T
M*TM)/2;:PRINT" M.":PRINT"POSSIB
LE MAX RANGE=";:PRINT USING S2$;
2*TM*V*COS(A1);:PRINT" M."
900 PRINTSTRING$(32,190);:PRINT"
TRAVEL TIME    :";:PRINT USING S
2$;T;:PRINT" SECS."
910 PRINT"PEAK REACHED AT:";:PRI
NT USING S2$;TM;:PRINT" SECS."
912 PRINT"YOU MISSED";TL;"OUT OF
 3"
914 PRINT"YOUR SCORE IS";TT
916 PRINT;3-TL;"TRIES LEFT":PRIN
TSTRING$(32,150);
920 SOUND1,5
930 GOSUB1530
932 IFN$="5"THEN950
935 IF TL<3 THEN 258
940 '***************************
950 '            menu
952 TL=0
960 CLS:PRINT@12,"*menu*":PRINT
STRING$(32,150);:PRINT
970 PRINT" (1) TO VIEW PLOT AND
ANY KEY ","       TO RETURN TO H
ERE."
980 PRINT" (2) TRY AGAIN, SAME T
ARGET?"
990 PRINT" (3) ERASE OLD TRAJECT
ORY"
1000 PRINT" (4) REVIEW INSTRUCTI
ONS"
1010 PRINT" (5) REVIEW RESULTS"
1020 PRINT" (6) NEW TARGET POSIT
ION"
1030 PRINT" (7) QUIT"
1035 PRINT" (8) SOLUTION"
1038 PRINT"                score
";TT
1040 PRINT STRING$(32,150);:PRIN
T
1050 PRINT"CHOOSE A NUMBER, FROM
 (1-8)";
1060 N$=INKEY$:IF N$=""THEN GOTO
 1060
1070 ON VAL(N$) GOTO 1424,258,13
30,100,810,1330,2000,1700
1080 SOUND1,1:GOTO950
1110 '*************************
1120 '        on target
1130 PSET(X,Y,5):SOUND1,1:ZZ=1:G
OTO750
1135 FOR R=1 TO 10:CIRCLE(XT+3,Y
T),R,5:GOSUB1140:NEXT R:GOTO1150
1140 CIRCLE(XT+3,YT),R,0:RETURN
1145 POKE65494,0
1150 PLAY"L4;O3;CEGFACGB":FORN=1
TO200STEP10:CLS(2):PRINT@234,"*
right on *";:SOUNDN,1:NEXTN
1160 TT=TT+100:TL=TL-1:GOTO800
1190 '**************************
1200 '     picture drawing
1210 PCLS:PMODE4,1:POKE65495,0
1214 '**************************
1215 '       landscape
1220 DRAW"BM0,155;R60;E5;R4;E4;R
2;U1;R2;E3;R6;D1;R1;E3;R1;E5;R2;
U1;R2;U1;R7;E7;R2;D1;R3;D1;F9;R1
;R2;D1;R3;D2;R5;D1;R1;F10;R3;F4;
R20;D2;F8;R2;U2;E4;R3;E3;R60"
1230 PAINT(10,191),5,5
1240 DRAW"C0;BM0,155;D36;R255;U3
6":DRAW"BM0,180;R255"
1250 FORST=0TO255STEP10:ST$=STR$
(ST):DRAW"BM0"+ST$+",185;U10":NE
XTST
1252 CIRCLE(10,188),3:LINE(110,1
90)-(110,185),PSET:LINE(210,190)
-(210,185),PSET
1255 FORS=1TO255STEP10:PSET(S,RN
D(140),5):NEXTS
1260 '**************************
1270 '        building
1280 DRAW"C5;BM205,155;U10;R10;D
5;R15;D5":PAINT(210,150),5,5:DRA
W"C0;BM205,147;R10;U1;L10"
1290 CIRCLE(210,145),5,5,1,.5:PA
INT(210,143),5,5:DRAW"C0;BM205,1
55;R25"
1300 DRAW"C0;BM5,155;D5R2E7"
1305 '**************************
1308 '  picture duplication
1310 PCOPY1TO5:PCOPY2TO6:PCOPY3T
O7:PCOPY4TO8
1320 '**************************
1330 '      random target
1332 PCOPY8TO4:PCOPY7TO3:PCOPY6T
O2:PCOPY5TO1
1334 SCREEN1,1:TR=0:IFN$="3"ORN$
="4"THEN1370
1335 XT=RND(230)+20:YT=170:IF XT
>198 AND XT<235 THEN1335
1350 IFPPOINT(XT,YT)=5THENYT=YT-
1
1360 IFPPOINT(XT,YT)=5THEN1350
1370 TA$="BM"+STR$(XT)+","+STR$(
YT)+";U3R2U2R2D2R2D10U7L5U1;C0;R
4U1L4"
1380 DRAW "C5;"+TA$
1400 DRAW"C0;BM"+STR$(XT+3)+","+
STR$(YT+10)+";G3E3F3H3D80"
1405 GOSUB 3000
1406 IFQQ=1THENQQ=0:RETURN
1408 POKE65494,0:IFJ=0THEN90
1410 IFN$="6"ORN$="3"THEN 1424
1420 GOTO295
1422 '**************************
1424 '           view
1425 SOUND150,1:SCREEN1,1
1430 '*************************
1490 '    checking keyboard
1500 SOUND240,1:SOUND100,1
1510 A$=INKEY$:IF A$=""THEN GOTO
1510 ELSE 1515
1515 IFB$="Y"THEN 308
1520 SOUND200,1:GOTO950
1530 PRINT@480,"press any key to
 continue";
1540 EXEC44539:POKE135,0:SOUND20
0,1:RETURN
1550 '**************************
1560 '      no path shown
1570 SOUND255,1:PSET(X,Y,0):RETU
RN
1571 '**************************
1572 '       ground contact
1575 SOUND1,20:GOTO810
1580 '**************************
1700 '    solution
1705 CLS(0):PRINT"possible solut
ion":PRINT
1708 PRINT@32,"target at";XT-7;"
meters";
1709 PRINT@64,"and";:PRINTUSINGS
3$;155-YT;:PRINT"meters height";
1710 PRINT@128,">";:INPUT"YOUR D
ISTANCE FROM TARGET";DI
1720 PRINT:INPUT"HEIGHT OF TARGE
T=";HE
1730 PRINT:INPUT"SHOOTING ANGLE
(0-90DEG)";AN
1735 AN=AN*(3.1416/180)
1736 HE=HE-X1+7
1740 T=-9.8*DI*DI:B=2*HE*COS(AN)
*COS(AN)-2*DI*COS(AN)*SIN(AN)
1742 IF B=0 THEN PRINT"***DIVISI
ON BY 0 !, TRY AGAIN***";:SOUND1
,30:GOTO1700
1745 IF (T/B)<0 THEN PRINT"***SQ
UARE ROOT OF NEG. NUMBER!**":SOU
ND1,30:GOTO1700
1750 PRINT"TRY THIS VELOCITY..."
;:PRINT USING S1$;SQR(T/B)
1790 GOSUB1530
1792 IF B$="H"THEN308ELSE960
2000 '**************************
2010 CLS(0):PRINT@11,"*thank*you
*";:SOUND200,1:GOTO40
3000 '**************************
3050 '       cannon
3100 A2=A:COLOR 0,0
3105 IF J=0 THEN LINE(7,151)-(11
,151),PSET ELSE LINE(7,151)-(X1,
Y1),PSET
3110 A2=(3.14/180)*A2
3120 X1=7+(7*COS(A2)):Y1=151-(7*
SIN(A2))
3125 COLOR5,0
3130 CIRCLE(7,151),4,5:LINE(0,15
5)-(7,151),PSET:LINE-(X1,Y1),PSE
T
3135 RETURN
6000 'subroutine of parabola w/
vectors
6030 SCREEN1,1
6060 V=45:A=45
6080 T=0:PI=3.1416:G=9.80:B=(PI/
180)*A
6090 T=T+.2
6100 V=45:A=45
6110 X=T*V*COS(B)
6120 Y=T*V*SIN(B)-(G*T*T)/2
6130 X=X+10:Y=155-Y
6140 XP=X:YP=Y
6150 IFY>155THEN7000
6160 XF=X+V*COS(B)
6170 YF=Y-(V*SIN(B)-G*T)
6180 IF YF<0THEN YF=Y+V*SIN(B)+G
*T)
6190 PSET(X,Y,2):SOUND200,1
6200 GOSUB 6250
6210 GOTO 6090
6240 '-------------------------
6250 LINE(X,Y)-(X,YF),PSET
6260 LINE(X,Y)-(XF,Y),PSET
6270 PSET(XP,YP,2)
6280 RETURN
7000 '**************************
7010 '   BACK TO INSTRUCTIONS
7020 QQ=1:GOTO1330
```

Are Your Programs Headed for a Breakdown?

by Dale L.Puckett
Contributing Editor

You should plan on it. What I'm talking about is *modularity*. You hear the word a lot when OS-9 hackers get together these days. It's basic survival. As we enter the new decade and our application programs get bigger and better, we're learning how easy it is to run out of memory with a 512K CoCo 3. Since the January issue of THE RAINBOW is traditionally the beginner's issue, this is an excellent time to review an important and timely concept.

I've always encouraged you to break your programs down into smaller, more manageable tasks — to make your programs *modular*. When you do this, you avoid common problems such as running out of memory.

There can be an analogy drawn between writing and programming. For example, novels are organized collections of well-written chapters, chapters are a collection of well-written paragraphs, and paragraphs are groups of carefully constructed sentences, etc. A writer begins by outlining ideas, then organizing sentences one word at a time.

A programmer's first step is often to define a problem in terms of smaller problems. These small problems can then be broken down into even smaller problems. Eventually you reach a point where you can translate these small problems into statements the computer can understand. When you've learned these techniques, you've learned structured programming.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP*: on packet-radio,* KOHYD *@* N4QQ*; on GEnie,* D.PUCKETT2*; and on CIS*, 71446,736.

The payoff comes next. After you've used a structured approach for a while, you find that many of the small problems are very similar and keep popping up again and again. If you write proper solutions to these small problems, you can use them over and over again in all sorts of programs. Each solution is written as a BASIC09 procedure. These saved procedures become modules, or building blocks, that you can use to solve larger problems. Eventually you own a library containing scores of modules.

To use these modules, simply run them from within your new BASIC09 programs. Parameters (another big word for beginners) make it practical for you to break your programs into smaller pieces. With BASIC09 you're able to define parameters that describe the data you need to process and pass them back and forth between your BASIC09 programs or procedures.

Without the ability to pass these parameters, you would still need to write a unique procedure for each task. With parameters a single procedure can solve many different problems. Let's use a specific example to explain this concept.

The easy way to solve the problem of multiplying 2 x 2 is to write a simple procedure that does just that. It would be a very simple procedure, unable to do anything except multiply 2 x 2. The proper solution is to write a single procedure that can multiply any two numbers. You can pass it a new set of numbers each time you need an answer. Essentially the numbers you are passing are known as parameters, which can be any numbers, characters or strings that BASIC09 understands — even pieces of data you have defined using BASIC09's `TYPE` statement. Let's look at some actual code.

The quick way to solve the problem of multiplying 2 x 2 can be accomplished in one line:

```
PROCEDURE print
PRINT 2*2
```

A proper, but useless, BASIC09 procedure looks like this:

```
PROCEDURE mult2by2
DIM first2, second2:INTEGER
DIM answer:INTEGER
first2:=2
second2:=2
answer:=first2*second2
PRINT answer
END
```

Both of the procedures above print 4 on your Color Computer screen. The only difference between the examples is that the second procedure is easier to read. It uses words that make sense in English and carefully defines its variables — a habit you should get into. It saves memory and it makes your programs easier to understand.

Here's the problem: What do you do when you need to multiply 3 x 4, or 4 x 12? If you use the techniques above, you must write more procedures, which is not too productive.

The answer is to write a generic multiplication program that can handle any number. For example:

```
PROCEDURE usefulmult
PARAM firstnum, secondnum:INTEGER
DIM answer:INTEGER
answer:=firstnum*secondnum
```

```
PRINT answer
END
```

To use the procedure `usefulmult`, you must pack it and run it from the OS-9 command line. You can also run it from within another BASIC09 program. If you're using *Shell+*, the command line looks like this:

```
OS9: usefulmult(10,20)
```

When you type these examples, `RunB`, BASIC09's runtime package, sets `firstnum` equal to 10 and `secondnum` equal to 20, then does the multiplication. Shortly after you type the OS-9 command line, 200 appears on your screen.

You don't always need to type a command line to run one of your BASIC09 procedures. Another procedure can also run them. The procedure below can print any part of the multiplication table. It accepts the beginning and end value of the table from you, then uses another procedure called from within a `FOR/NEXT` loop to print the table.

```
PROCEDURE runit
PARAM   first,second:INTEGER
DIM Count1, Count2:INTEGER
DIM   answer:INTEGER
FOR Count1:=first TO second
 FOR Count2:=first TO second
 answer:=count1*count2
 RUN printit(answer)
 NEXT count2
 PRINT
NEXT count1
END

PROCEDURE printit
PARAM answer:INTEGER
PRINT USING “I8>”: answer
answer:=answer*2
END
```

OS-9 Spotlight

A professional *Multi-Vue*-based paint program has finally arrived. *MVCanvas*, written by Mike Haaland, was a big hit at the Game Point Software booth during RAINBOWfest Somerset. It is the first program featured in the OS-9 Spotlight.

Visitors at RAINBOWfest stopped in their tracks when Haaland told them *MVCanvas* was running under OS-9. Everyone had said it couldn't be done. *MVCanvas* is a VEF format graphics editor fashioned after *CoCo Max*. It has a Cipboard function, lets you switch palettes, and supports multiple fonts and digitized pictures. You can work on a 320-by-200-pixel, 16-color screen, or you can use a 640-by-200 screen that delivers four colors. Print drivers are supplied for most popular printers. AIF and icon files are also supplied.

MVCanvas supports a wide variety of common and powerful commands as well as such features as Spray Can, Fill, Brush and Stamps.

MVCanvas is an excellent graphics editor. If Mike makes a few subtle changes to his user interface, it will be outstanding. My first suggestion concerns the location of several menu items. Generally similar functions should be grouped together. For example, Clear appears under the File menus. It seems to me that when you clear the screen, you are editing. I would put this command under the Edit menu. Likewise, the Load Font option belongs under the Font menu, not the Resolution menu.

Another subtle change to the Edit menu would clear up Mike's metaphor and present a more universal man/machine interface. Cut, Copy and Paste, as implemented in *MVCanvas*, are somewhat confusing — or at least nonstandard. Most visual interfaces let you copy an object from a document into a clipboard and then paste it somewhere else in the document or in another document. When you copy an object, the original object remains. A cut is similar to a copy except when you cut an object, you remove it from the original document. Paste is almost always used to place an object in a document. I would like to see Haaland adopt this universal metaphor in *MVCanvas*.

Clipboards are generally temporary in nature. After you copy an object to a clipboard, it stays there until you copy or cut something else. The new copy or cut replaces the entire clipboard. I also believe Mike could use the metaphor of a scrapbook for his Cut-to-Disk function. The disk files created by this function, like a scrapbook, are permanent files.

In many paint programs, the toolbox takes up valuable space on the screen. Not so with *MVCanvas*. With Haaland's program you open the toolbox only when you need it by clicking on the word Tools in the menu bar. Yet a small change here could really enhance the operation of the toolbox.

Haaland has implemented a modal toolbox. Simply stated, once you open the toolbox, you can't do anything else. You can work in the toolbox only until you close it by clicking on the OK button. A nonmodal toolbox, which is almost impossible to deliver using the current `WindInt` manager, might be an impossible goal. However, a quick escape route just might make it bearable.

Two methods could be used. You can use a hot key on the keyboard to close the toolbox as soon as you click on your selection — actually, it would also be nice to be able to call up the toolbox by striking a hot key. Better yet, why not be able to exit the toolbox with the tool as soon as you click on the tool you need? A single click would work great for all drawing tools. However, you may need a double click to let OS-9 know that you want to go back to the drawing board and not stay in the toolbox to change the color or pattern, etc. Here's another nice trick that could be used in the toolbox: As soon as you click on a tool, the mouse pointer could turn into that tool, whether a brush, pen or spray can.

It is easy to open or save a file with *MVCanvas*. The program displays a list of files. You click on the one you want, then push a Load button at the bottom of the screen. It would be nice to be able to just double-click on the file you want.

Since Haaland uses a pipe to print your *MVCanvas* images, his `prtdmp` commands can also be used from the OS-9 command line. When printing VEF pictures from the command line, you can tell OS-9 to perform this time-consuming task in the background while you continue to paint with *MVCanvas* in another window.

Haaland is already talking about adding rotation and sizing and several other nice features. When Mike makes the metaphorical changes we highlighted above, *MVCanvas* will not only sing — it will shout. *CoCo Max III*, look out! ❑

Run the procedure `runit`, using the BASIC09 command line:

```
run runit(1,9)
```

It looks a lot like the multiplication tables you learned in school, doesn't it? But if you want to run the multiplication tables between 20 and 30, you can do it by typing `run runit(20,30)`. You used the same format or syntax but different numbers. This example shows how parameters can make your life easier.

The next thing you need to know about parameters is that they can be passed in both directions. To prove this to yourself, add the line:

```
PRINT USING “I5>”;answer;
```

to the procedure `runit` between the `run printit` statement and the `NEXT count2` statement. When you run `runit` the next time, you'll see it prints two columns. The second column prints the value of the answer after it returns from `printit`.

How is the answer doubled each time it comes back from `printit`? Take a closer look. It's right there in the code — `answer:=answer*2`. But you printed it within the procedure `runit`. This proves that the parameter answer was passed both ways — to and from the procedure `printit`.

Before you start relying on parameters to do your dirty work, know that there are two types of parameters you can pass. A parameter can be an actual value, or it can be a name. If you type `run runit(20,30)`, you are passing a value to `runit`. Conversely, if a program running `runit` contains the line `run runit(first,second)`, it is passing by name.

If you pass a parameter to another procedure by name, that procedure can return a new value to you. Essentially the called procedure associates the memory location of the parameter you passed with a name in a local `PARAM` statement. The procedure can change the value stored there and return that value to you.

However, if you pass a parameter to that same procedure by value, it is not able to return a new value to you. In this case the parameter you pass is stored only temporarily. When control is returned to the calling procedure, the system forgets it ever knew about the value you passed. There is a hidden benefit, however. If you want to ensure that a called procedure doesn't change the value of the calling procedure, just pass your parameters to it by value. You can even do this, when you are passing a variable, by multiplying the variable by a constant, as in:

```
RUN printit(answer*1)
```

When you start to use parameters heavily, you must concentrate on one additional piece of housekeeping. You must make sure that the parameters passed to a called procedure are exactly the same type as the parameters in the calling procedure. One way to ensure this is to copy the `DIM`, `PARAM` and data type statements into both procedures with your editor. That way, you'll know they are all the same.

After you study the procedures in this month's column and feel comfortable with the concept of parameters, look back through one of the issues when we were pursuing the *KISSDraw* series. You'll see that even though we were passing some complex data types, we were using the same techniques you learned this month. You can also pass parameters from BASIC09 to an assembly language or C language program. But that's a subject for another tutorial.

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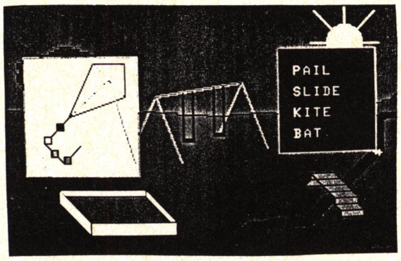

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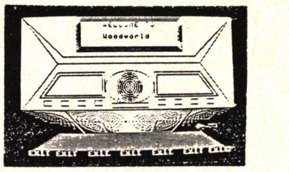

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ZORK *(Infocom)*
350/328 Konnie Grant, Toledo, OH
350/587 Matthew Yarrows, Easthampton, MA
ZORK II *(Infocom)*
400/503 David P. McCoy, Franklin, NC

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's bimonthly "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG>prompt, pick MAIL, then type SEND and address to: EDITORS.

SCOREBOARD POINTERS

In conjuction with THE RAINBOW's Scoreboard, we offer this bi-monthly column of pointers for game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

- Andy Schmidt: In the *Interbank Incident*, give money to the waiter at the bar in Germany. Then give the wine he gave you to Angel, the ticket lady, at the station in Seattle. Talk to her and she will usually give you a clue. Also, give the invitation to the bartender in the train and talk to him.

In *Enchanter*, how can I get the Ozmoo Spell?

Joan Malenfant
Lewiston, Maine

- Thelma J. Saffold: In *Night of the Living Dead*, kill the caretaker with the shovel and search him for the keys. Unlock the gate with the key, enter the cemetery, then lock the gate quickly to avoid the choirboy.

Tony Olive
RAINBOW Magazine

- Chuck Carpinello: To get the wizard in *Dungeons of Daggorath*, go down into the holes of the dungeon. How do you summon the book?

Ryan Middleton
Winter Springs, Florida

Scoreboard:

I'm looking for any hints on *Pyramid 2000*. How do you get through the maze?

Tanya Pelley
Rothesay, New Brunswick

Scoreboard:

In *Dallas Quest*, when I am ready to go to the airport and fly to South America, I discover I must always leave something behind since the game tells me I can't carry any more items. Is there a way I can carry all these items?

In *Interbank Incident*, how do you enter the apartments, the room in the Eifel Tower, and the other locked rooms? Also, where do you find the computer cartridge? What do you put in the slot on the yacht when you are in Rio?

Jeremy Gross
Bridgewater, New Jersey

Scoreboard:

In *Castle of Tharoggad*, I can get to the blue level, but I've tried everywhere and I still can't get out. The passwords, in order, are: `F102051KI`, `C812422VU`, `2VVV00QBA`, and `0004E200G`. This places you above the door to the level below, right at the start of the blue level. Can anyone give me the password that will let me under the door on the blue level that leads up to the next one?

Normand Gibson
Aylmer, Quebec

Scoreboard:

In *Caladuril-Flame of Light*, how do you tie the rope to the bucket? What is the proper sentence? Also, how do you unlock the chest?

In *Caladuril 2 - Weatherstones End*, how do you connect the nail, string, sticky tape and balloon? I know what these objects are supposed to do, but I can't tie them together.

In the *Power Stones of Ard*, how do you get past the green door? Also, how do you use the gems?

Tony Durst
Brantford, Ontario

Scoreboard:

In *Zaxxon*, to avoid the space conflict where you often are killed, pause the game for about one minute. When you unpause it, the ships will whiz by, making you stay alive a little longer. This works on all space sequences.

Now that I have given you this clue, someone help me. In *Castle of Tharoggad*, how do you get to the third level? I can't find the ladder to the next level. What do you do with the magic match? These seem to be the only things barring my way to get further in the game. Please help, someone!

In the *Seventh Link*, go east of the bakery in the beginning city. Open the door and climb down every ladder. In one dungeon under the city you will find Hogramil, a thief. Also, far to the southeast in the city you will find Tharon, the clerec. Use the non-key command `Join` plus a direction to get them to join.

Andrew Yarrows
East Hampton, Massachusetts

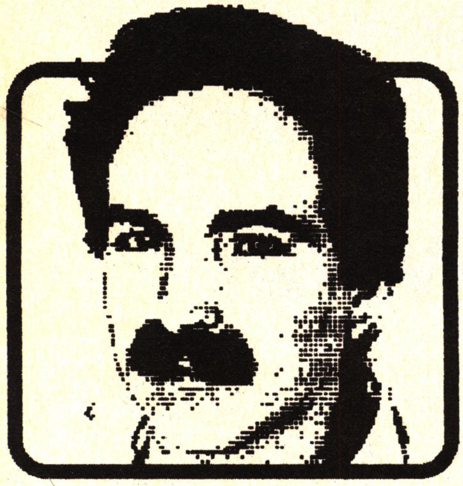
Scoreboard:

A hint for the role-playing adventure, *Pool of Radiance*: Use the magic spell "Detect Magic" whenever you discover weapons or items given to you or conquered. A star beside an item indicates that it is magical and is worth taking to be identified. This will allow you to pick and choose only the best equipment for your characters.

Don't try to destroy every section of Phlan without searching the wilderness outside of the city. Much experience and knowledge can be gained there to help you inside of Phlan.

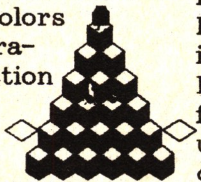
John Hoffman
Steelton, Pennsylvania

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers" c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issue. For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the Mail section of our Delphi Coco SIG. From the CoCo SIG> prompt, pick Mail, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

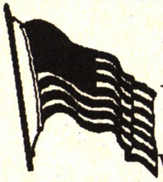


Pyramix

This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. Disk: $19.95



The Freedom Series



Vocal Freedom

Vocal Freedom turns your computer into a digital voice recorder. The optional Hacker's Pac lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone. Will run on a CoCo 1, 2, or 3. Vocal Freedom Disk: $34.95. Optional Hacker's Pac Disk: $19.95. Disk for both: $49.95

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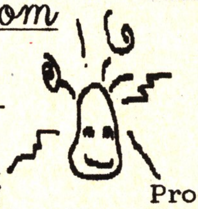

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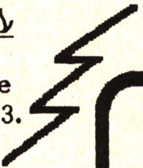

These three utilities give real power to your CoCo 3.

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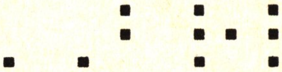

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From Reader to Writer

I find the greatest challenge in writing is choosing a subject. Perhaps this is stopping *you* from writing an article for THE RAINBOW. Once I have surmounted this challenge and clarified my thoughts a bit, the words usually fall into place.

Our readers range from the devout programmer interested in learning every aspect of the CoCo to the uninitiated game player who just wants to beat John Doe's score at *Thexder*. So just about anything that has to do with the CoCo can be the basis for a winning article.

Just look at how *you* use the CoCo. Perhaps you use it for running your business, and you've written software for just this purpose. Or maybe your CoCo is set up to monitor the weather via homemade hardware mounted on your roof. Whatever the case, if you are interested in it, chances are someone else is too. A suggestion at the recent RAINBOWfest in Somerset, New Jersey, was to publish templates for spreadsheets. Do you use a spreadsheet template that others might be able to use? We are looking for general-interest articles (humor, pitfalls, etc.), tutorials, hardware projects, BASIC and OS-9 applications, entertainment programs, and articles explaining various aspects of computer use.

If you feel unsure about your level of knowledge, remember that while experience and knowledge about your subject is important when writing, you don't have to be an expert.

There are a few things to consider when choosing a subject on which to write. Pick a topic that is interesting to as many readers as possible. Readers love hands-on articles (listings, hardware projects, etc.). For that reason we love them too. Don't assume anything about the reader; make sure every point is clear. On the other hand, be as brief as possible because article length is a very important consideration in our evaluation process.

To give you a basis with which to work, a three-column magazine page holds just about 1000 words. To determine the length in inches of a BASIC listing, cold-start the CoCo and load the program. Now enter `PRINT(22824-MEM)/4/32`. We can place 28.5 inches of text or listing on one magazine page.

Once you have completed your work, all necessary listings should be saved to tape or disk in tokenized (regular) and ASCII form. Include your text in ASCII form on the disk too. If your program is in assembly language or C, include the source as well as the object file. Provide text in double-spaced hard copy, and send a hard copy of the listings. Include any figures or photos that clarify your work. If we don't have a part of your submission, we cannot evaluate it properly. We will not make a decision to publish a series or multi-part submission until we have all parts in complete form. Similarly, we can't tell you over the phone if we'll publish your work. We must see it first.

When we receive your submission, it will be logged into our database and assigned to an evaluator. This person will ascertain whether or not the package is complete. Then he will review the submission for content and clarity and also measure all listings and text. The evaluator makes recommendations to us based on the above criteria as well as on the usefulness of the proposed article and its interest to RAINBOW readers.

We will then make a decision to buy the submission right away, hold it for a future issue, or reject it. Keep in mind that monthly themes and our desire to provide a mixture of topics in each issue can mean we must hold your submission for some time.

If your submission is rejected, you will be told why. Try not to take this rejection personally; we judge your article, not you. Perhaps the listing is too long to justify what the program does. Maybe your topic is too general or doesn't appeal to a reasonable number of readers. Refine your work and try again.

This should be enough to get you started. If you need more information, please call or write; we'll be glad to send you submission information.

— Cray Augsburg

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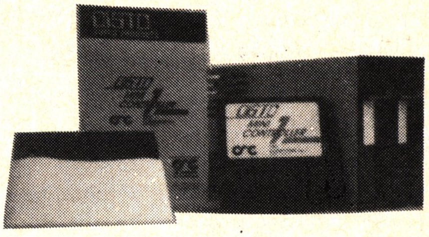

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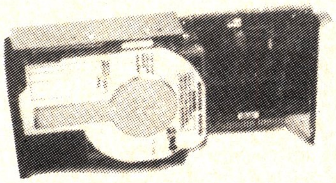

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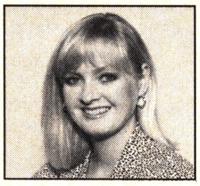

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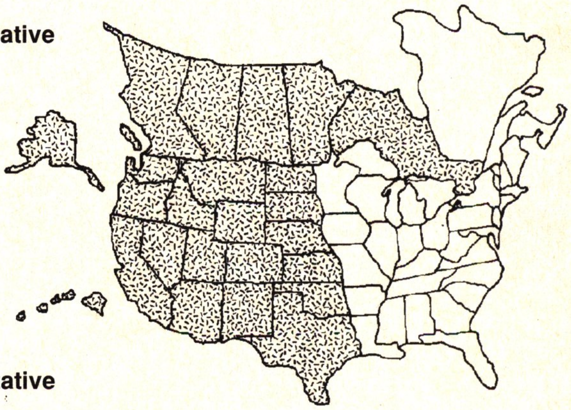

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SYSTEM REQUIREMENTS: CoCo 3 with at least 256K memory, OS-9 Level 2, Mouse or Joystick (Hi-Res Joystick Adapter recommended), Synthesizer(s) with MIDI-In jack, plus a Serial to MIDI cable. Tandy's DMP printer, a MIDI Interface Pak, and a Multi-Pak are optional equipment.

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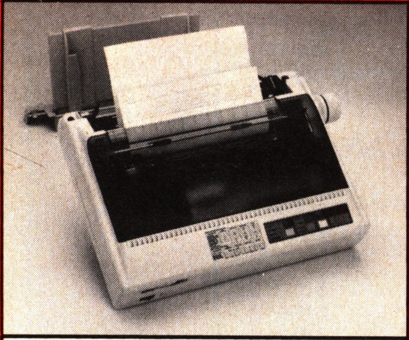

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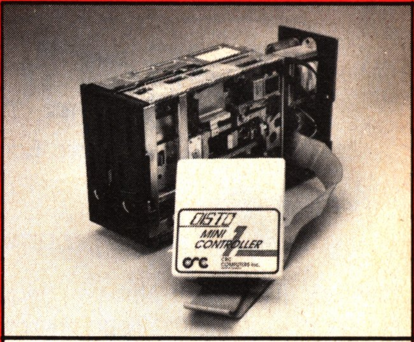

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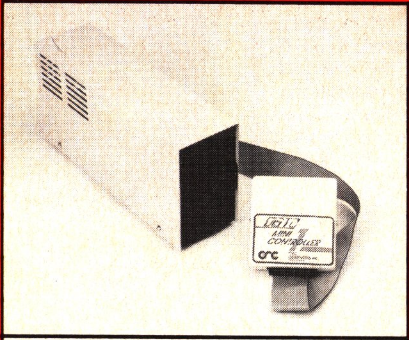

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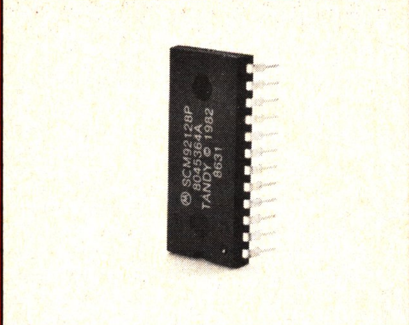

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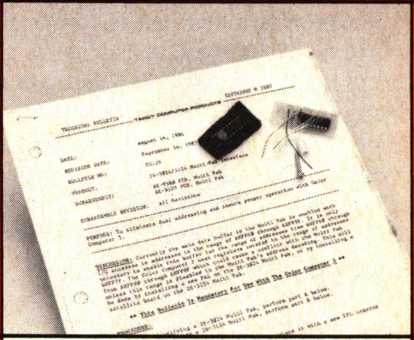

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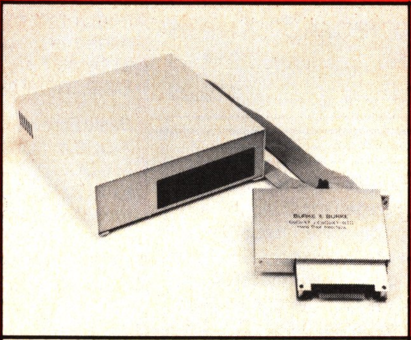

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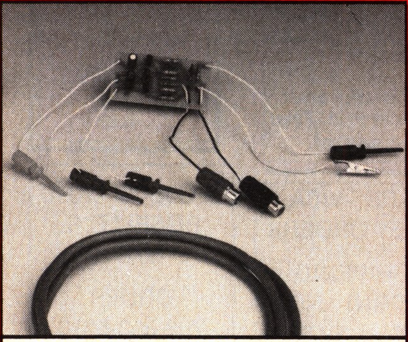

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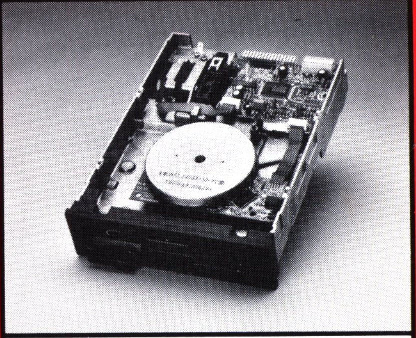

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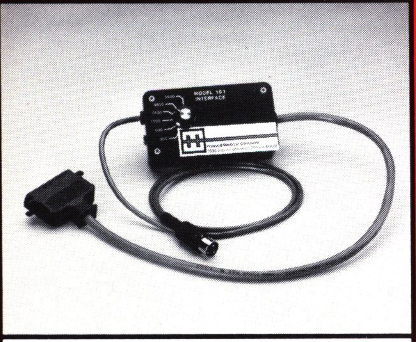

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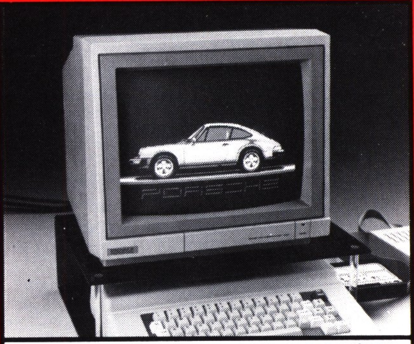

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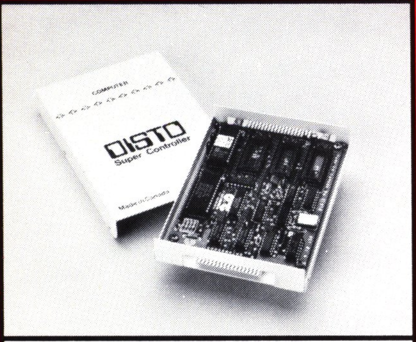

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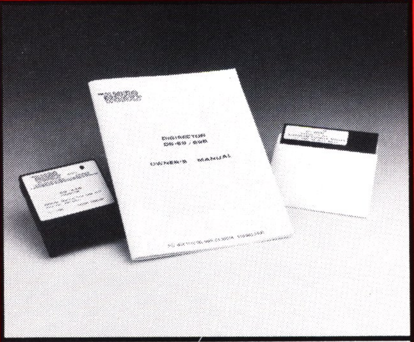

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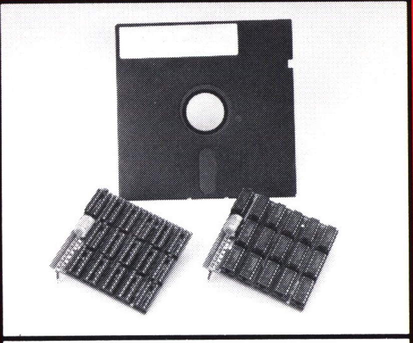

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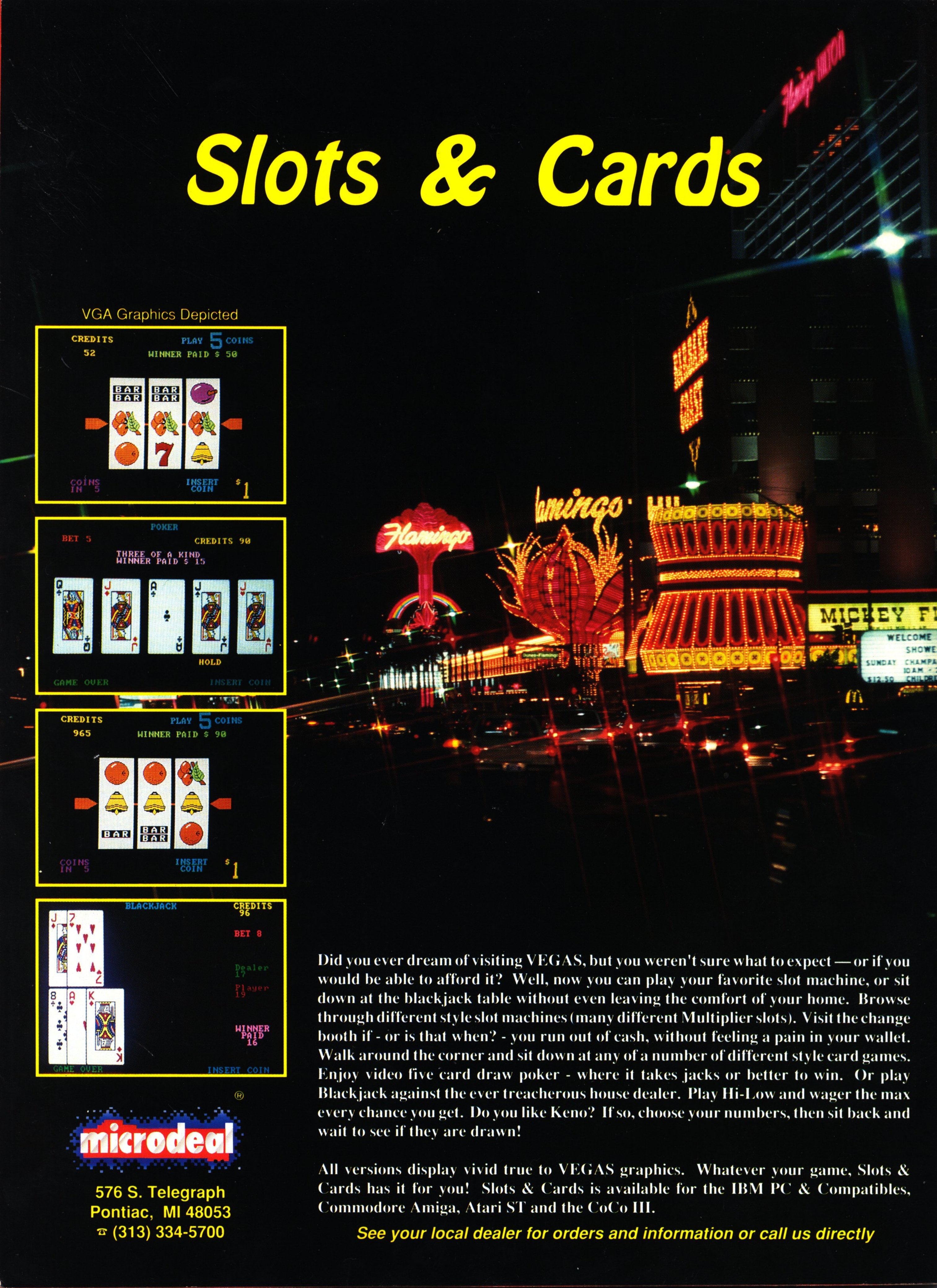
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